

The concealed copulatory structures of the *Pyrgomorphidae*

(Orth. Acridoidea)

PART. IV. TRIBES *DESMOPTERINI*, *MONISTRINI*,
CHLORIZEININI, *POEKILO CERINI* AND *PHYMATEINI*

BY

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(Láms. II-IX).

INTRODUCTION.

Part I of this study (Kevan, Akbar and Chang, 1969) includes a general discussion of the acridoid male and female concealed copulatory structures, with particular reference to the *Pyrgomorphidae*, together with a glossary of terms, including those used herein. Parts II and III (Kevan, Akbar and Chang, 1970; 1971) discuss the changes in the arrangement of tribes and genera that have been made in the *Pyrgomorphidae* since the preliminary one by Kevan and Akbar (1964), and give an account of the fifteen tribes constituting what has been termed Group 'A' of the family, characterized by the open and usually larger, approximated metasternal pits, a body form that is not commonly strongly fusiform but most often subcylindrical or elongate, and sometimes by other features (see Kevan, Akbar and Chang, 1970). The present paper treats the first two series of Group 'B' (tribes of Series V and VI). Opportunity is also taken to present photographs of type material of species for which similar figures have not previously appeared and which it is not proposed to illustrate elsewhere in connection with generic revisions.

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The authors wish to repeat their grateful acknowledgements to those institutions and individuals already referred to in Part I. Financial support was received from the National Research Council of Canada.

GROUP B.

Metasternal pits usually small, round, usually closed and rather widely separated, joined by two sutures, the anterior one straight or slightly sinuous, the other more variable in form, but often straight also. Rarely one of the sutures may be suppressed or incomplete in very robust or depressed species or in those with a wide, flat sternal lamina and very widely spaced metasternal pits. Body form usually, but by no means always, distinctly fusiform, or heavy and robust, or both; pronotum sometimes with large tubercles (not found in Group 'A'); hind femora always with ventral basal lobe more prominent than the dorsal lobe. Distribution much wider than for Group 'A', predominantly circumtropical and subtropical (poorly represented in the Americas), but with a few Eastern Hemisphere species extending into temperate regions (including the Palaearctic, from which Group 'A' is absent); very strongly represented on the African continent but with rather few species in Madagascar (i. e. the reverse situation to Group 'A'); Australian *Pyrgomorphidae* belong mostly to Group 'B'.

SERIES V.

This series comprises two tribes, *Desmopterini* and *Monistriini*, of very dissimilar general appearance, but both restricted to the same quarter of the globe. The latter tribe is limited to Australia (with Tasmania); the former is predominantly Papuan in distribution, but occurs from northeastern Queensland to the Moluccas and Philippines. All Australian *Pyrgomorphidae*, except for the bacilliform *Pseudurini* (Group 'A') and the widely distributed genus *Atractomorpha* (*Atractomorphiini*, Series VIII), belong to this series. Similarly, all *Pyrgomorphidae* of Group 'B' from the Papuan, Moluccan and Philippine regions fall into the present series, with the exception of *Atractomorpha* and of *Tagasta* (*Tagastini*, Series VIII). Without entering into details of morphology, both these genera may be distinguished from

members of the present series by their predominantly green coloration (except in a few individuals), combined with a noncompressed, strongly or elongately fusiform body. *Desmopterini* are recognizable from other *Pyrgomorphidae* by their laterally compressed, usually rather elegant body form, by their generally sombre coloration, and, except for a few brachypterous species, by their rather parallel-sided tegmina which are excised, truncated, subtruncate, or at least abruptly tapered and frequently mucronate at their apices. *Monistriini* are generally robust, often rather heavy-bodied and usually speckled and beset with at least a few granular tubercles or raised pustules; a high proportion of them are micropterous or strongly brachypterous.

The phallic structures of both tribes of this series are very variable. The epiphallus in all *Monistriini* studied has very well developed anterior projections; in *Desmopterini* a similar condition is found in some genera, although the projections are reduced in others. The form of the ectophallus, in spite of its great variability, shows a considerable degree of parallelism between the two tribes. In each it ranges from a rather conventional, pear-shaped form, with a fairly extensive central membrane, to a rounded condition with small, closely-set rami of the cingulum (forming a kind of tail), between which the central membrane occupies a very reduced area. The zygoma is large and broad and the basal emargination is generally well developed with a strong, deep basal thickening. The endophallus in both tribes usually has strongly developed dorsal inflections of the endophallic apodemes and specialized aedeagal valves (although the specialization differs in the two tribes).

In the female structures there is also a degree of parallelism in the form of the subgenital plate and spermatheca. In the former, there are usually well developed contact areas in *Desmopterini*. These are found in some, but not all, *Monistriini*. The spermathecae of the two groups (except for the desmopterine genus *Apodesmoptera*) are very similar indeed. The spermathecal vesicle and caecum are poorly differentiated and have a long (often very long and narrow), convoluted, sub-apical spermathecal appendage, bearing a small apical bulb and sometimes small secondary diverticula. The similarity of the spermatheca, and its distinctness in form from that of most other *Pyrgomorphidae*, probably provide the best evidence, along with zoogeographical considerations, for placing the two tribes together.

TRIBE 16. DESMOPTERINI.

(Figs. 1-24).

- [Geslacht *Acridium*] Groep IV. *Pyrgomorpha* Haan, 1842, *In* Temminck, *Verh. natuurl. Gesch. Ned. overz. Bezitt.*, XVIII (Zool., 7), 145 [no "Groep IV"], 148 (*partim*).
- [Famille des Acridides (*Acrididae*)] *Truxalites*.—*Truxalites* Blanchard, 1853, *In* Hombroen & Jacquinet, *Voy. Pole Sud, Astrolabe et Zélée*, IV (Zool.), 336 (*partim*).
- [Fam. *Acrididae*] Limited Fam. *Tryxalidae* Walker, 1870, *Cat. Derm. Salt. Brit. Mus.*, III, 494 (*partim*) [contained species now known as *Desmoptera novaeguineae* (Haan) and *Desmoptera sylvatica* (Montrouzier)].
- [Fam. *Acrididae*] Limited Fam. *Xyphoceridae* Walker, 1870, *Cat. Derm. Salt. Brit. Mus.*, III, 520 (*partim*) [contained *Stenoxypus variegatus* (Blanchard)]; 1871, *Ibid.*, V (Suppl., 3), 101 (*partim*) [contained *Stenoxypus*].
- Sub-tribus [and sub-tribu] *Systellae* Bolívar, 1884, *An. Soc. esp. Hist. nat.*, XIII, 20, 22, 50 (*partim*).
- Subfam. *Desmopterinae* Bolívar, 1905, *Bol. Soc. esp. Hist. nat.*, V, 105 [see also Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1508; Akbar, 1968, *Sind. Univ. Sci. Res. J.*, III, 173].
- Tribu Trigonopteriginos Bolívar, 1905, *Bol. Soc. esp. Hist. nat.*, V, 298 (*partim*) [*Doriaella* only].
- Sect. *Desmopterae* Bolívar, 1909, *Gen. Ins.*, XC, 4, 34; Willemse, 1930, *Tijdschr. Ent.*, LXXIII, 74; 1931, *Treubia*, XII (Suppl.), 222.
- Sect. *Systellae* Bolívar, 1909, *Gen. Ins.*, XC, 4, 51, 52 (*partim*) [*Doriaella* only].
- Section *Desmoptera* Willemse, 1922, *Nova Guinea*, XIII (Zool., 5), 707; 1932, *Mém. Mus. Hist. nat. Belg.* (hors. Série), IV (3), 45.
- Gruppe *Desmopterae* Ramme, 1941, *Mitt. zool. Mus. Berlin*, XXV, 38.
- Tribe *Desmopterini* Rehn, 1951, *Proc. Acad. nat. Sci. Philad.*, CIII, 211; 1953, *Grassh. Locusts Austral*, II, 19, 21, 24, 25, 27, 41, 42, 43; Kevan, 1957, *Nova Guinea* (n. s.), VIII, 197, 198; 1959, *Publ. cult. Cia. Diam. Ang.*, XLIII, 23, 203, 204; 1961, *Ent. mon. Mag.*, XCVI (1960): 204; 1963, *Nova Guinea* (n. s.), X, 361, 362; Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1507, fig. 1 (map), 1520, 1525; Kevan, 1966, *Eos, Madrid*, XLV, 573; 1966, *Ent. Medd.*, XXXIV, 392; 1967, *Pacif. Ent. Newsletter*, I (2), 6; 1968, *Proc. R. ent. Soc. Lond.* (B), XXXVII, 162; Akbar, 1968, *Sind. Univ. Sci. Res. J.*, III, 125, 126; Key, 1969, *Austr. J. Zool.*, XVII, 358, 412; Kevan, Akbar and Chang, 1969, *Eos, Madrid*, XLIV (1968), 168, 185, 193, 194, 218, 219, 220, 227; 1970, *Ibid.*, XLV (1969), 175, 176; Kevan, 1970, *Pacif. Ins.*, XVII, 543, 66; Kevan, Akbar and Chang, 1971, *Eos, Madrid*, XLIX (1970), 133, 144.

Subfam. *Trigonopteryginae* Dirsh, 1952, *Ann. Mag. nat. Hist.* (12), V, 82, 83 (*partim*) [*Doriaella* only].

[Subfam. *Trigonopteryginae*] Tribe *Trigonopterygini* Kevan, 1962, *Ent. mon. Mag.*, LXXXVIII, 265, 267 (*partim*) [*Doriaella* only].

External features: A rather uniform group; body laterally compressed, usually rather slender; integument generally rather finely rugose, of sombre coloration, usually brownish or greyish, often mottled, occasionally with dark, greenish, moss-like suffusion, very rarely more uniformly dull green; antennae subensiform to strongly flattened and expanded basally, situated in advance of, and not very close to lateral ocelli; head strongly conical, frontal profile generally concave; fastigium of vertex usually bluntly triangular; pronotum compressed, with lateral carinae of disc well developed, lateral lobe often with an oblique anterior ridge, infero-posterior angles sometimes very prominent; prosternal tubercle generally transverse with a long, acute or papilliform median process; mesosternal lobes with inner margins parallel or convergent behind; tegmina rarely reduced, never absent, usually considerably surpassing the hind femora and with subparallel costal and anal margins, the former most often distinctly sinuous at the base, apex excised, truncated, subtruncate, or at least abruptly narrowed, frequently mucronate, main longitudinal veins very frequently with small nodules; hind wings (when fully developed) often distinctly pigmented (reddish, orange, yellow, or infumated), sometimes subtruncated or even excised apically. Male abdominal terminalia usually but little specialized, although occasionally swollen or with inwardly curved cerci; ovipositor usually rather slender.

Principal phallic characters: Epiphallus of variable, but generally conventional form, bridge usually (but not always) rather slender and wide, anterior projections varying from prominent to reduced, sometimes acutely pointed (subtribe *Apodesmopterina*), appendices generally rather simple, lateral plates long to short, lophi with apical hooks usually dorsally, but sometimes dorsolaterally directed; ectophallus varying in shape from elongate, subparallel-sided to pear-shaped or sub-spherical, central membrane moderately extensive to very small, zygoma broad, usually extending to or beyond the middle of the cingulum, its posterior margin usually subtruncate or even slightly excised, sometimes with a posterior dorsal transverse ridge and occasionally a median longitudinal ridge, suprazygomal plate not very extensive, usually broadly rounded, sometimes tongue-like or reduced or absent, basal emar-

gination distinct, usually subcircular, not commonly very large, occasionally reduced, apodemal plates in lateral view rounded anteriorly, valves of cingulum usually rather small, if larger, then of simple form, rami of cingulum generally rather narrow in dorsal view, but of variable length and proximity, ventral process variable but seldom very large; aedeagal sclerites generally rather stout (very slender in *Apodesmoptera*, subgen. *Brachydesmoptera*) but otherwise variable, often rather straight but sometimes quite strongly curved upwards apically, apices undivided, endophallic apodemes usually with well developed, occasionally very large, dorsal inflexions which may be produced backwards (sometimes strongly), ventral processes absent or insignificant, spermatophore sac of variable form, but seldom large, gonopore typically placed well before the middle, only occasionally more posterior in position, pseudoarch nearly always small or insignificant, aedeagal valves usually strongly, though finely, denticulate, often large and of specialized form, frequently cap-like, occasionally elongate.

Concealed female structures: Subgenital plate with posterior edge smooth or but weakly crenulated, varying from slightly produced to excised on each side of the egg-guide, latter never very long, often reduced and blunt, columellae absent, variously sculptured contact areas usually divided into different areas, almost always well developed; spermatheca and caecum confluent, either elongate with an indistinct spermathecal vesicle and a convoluted subapical appendage (which is often very long or which may bear short secondary diverticula) ending in a small apical bulb, or with a more distinct spermathecal vesicle bearing an inflated, subapical caecum-like appendage "which probably incorporates a poorly differentiated true caecum together with a much enlarged and shortened appendage); spermathecal duct very variable in length, terminal dilation short to long, usually well defined.

Distribution: Confined to the South Pacific region, extending from northern Queensland *via* New Guinea and associated islands to the Moluccas and Philippines. [Records exist for Borneo, but they are probably erroneous (Kevan, 1966 b)].

This tribe, although falling into Group 'B', seems to have certain affinities with the outwardly very different *Nereniini*, the last tribe of Group 'A'. For example, in the male, the abdominal terminalia may be swollen in certain genera of both tribes, and the specialized endophallus of *Apodesmoptera*, especially of *A. (A.) mira* Rehn, is superficially rather similar to that of *Nerenia*. In the female, the subgenital

plate of both tribes is usually endowed with sculptured contact areas, and the spermathecae shown parallel variation. The elongate type of spermatheca with a long, convoluted appendage found in many genera of *Desmopterini* is reminiscent of various *Nereniina* and is somewhat intermediate between the general *nereniine* type and the exaggeratedly elongate form found in *Nerenia* and *Megra*. [The inflated type of spermatheca found in *Apodesmoptera* (*Desmopterini*) is not at all unlike that of *Noonacris* (*Nereniini*), but is probably differently derived]. Thus, while these similarities could be due merely to convergence, it would seem significant that both tribes are predominantly from the same zoogeographical region. The similarities between *Desmopterini* and *Monistriini* have already been referred to.

On the basis of their copulatory structures and geographical distribution, it is possible to divide the *Desmopterini* into two subtribes.

Subtribe a. DESMOPTERINA.

(Figs. 1-20).

Tribe *Desmopterini*: References given above in bibliography of tribal nomenclature; *partim* from Rehn, 1951 onward.

External features: Foveolae not occupying as much as two-thirds of the dorsal area of the fastigium of the vertex; tegmina, not usually bearing their apical points toward the anterior margins, but if so, then rather abruptly narrowed at base and main veins with fairly well developed nodules.

Principal phallic characters: Epiphallus with anterior projections truncated, rounded or reduced, not pointed; ectophallus with rami of cingulum well separated, or, if closely approximated apically, strongly convergent, ventral process broad, often triangular; endophallus with aedeagal sclerites less highly specialized than in next subtribe, but aedeagal valves more strongly denticulate and frequently of curious cap-like or sinuous form.

Concealed female structures: Subgenital plate with posterior edge produced or at least subtruncate medially (not concave on either side of the egg-guide, main contact areas transverse; spermatheca with a narrow spermathecal vesicle, narrow confluent caecum and a convoluted, subapical appendage which is long and ribbon-like (in most genera) or

shorter with small secondary diverticula, in either condition with a small apical bulb (which may be indistinct).

Distribution: Northern Queensland, New Guinea, Bismarck Archipelago, Moluccas. [Records for the southern Philippines and Borneo exist, but they are probably erroneous (Kevan, 1966 b)].

Included genera: *Desmopterella* Ramme, 1941; *Desmoptera* Bolívar, 1884 (including subgenus *Platydesmoptera* Ramme, 1941); *Stenoxypsula* Kevan, 1963; *Stenoxypsiellus* Ramme, 1941; *Stenoxypsus* Blanchard, 1853; *Paradoriaella* Willemse, 1961 (only female known); *Doriaella* Bolívar, 1898; *Menesesiella* Kevan, 1963; *Menesia* Willemse, 1922.

Species examined: *Desmopterella angustata* Ramme, 1941 (W. North-east New Guinea to N. West New Guinea including Japen I.; dubiously Halmahera — Fig. 1); *D. biroi* (Bolívar, 1905) [= *D. rammei* Kevan, 1963] (Schouten Is.?, NE. West New Guinea, Northeast New Guinea, E. Papua — Fig. 4) [Type species]³; *D. buergersi* Ramme, 1941³ (NE. West New Guinea, Northeast New Guinea, Papua — Fig. 2); *D. cercata* Ramme, 1941 (middle N. New Guinea); *D. circe* Kevan, 1970 (SE. Papua, d'Entrecasteaux Is., Louisiade Archipelago); *D. curvata* Kevan, 1970 (NE. West New Guinea); *D. curvicercis* Ramme, 1941 (W. C. Northeast New Guinea); *D. dahli* Ramme, 1941 (New Britain, Umboi I.); *D. denticulata* Ramme, 1941 (north West New Guinea except Vogelkop Peninsula, ? Japen I.); *D. esme* Kevan, 1970 (W. C. mountains of West New Guinea); *D. explicata* (Karsch, 1888) [= *D. media* (Bolívar, 1898) = *D. insularis* (Sjöstedt, 1931) = *D. bunki* (Sjöstedt, 1936) = *D. sundaica*, *auctt.*, *nec* (Rehn, 1909)] (Papua, except most easterly parts, E. Northeast New Guinea, SW. West New Guinea; islands of Torres Strait, N. Queensland, Aru and Key Is.); *D. haani* (Bolívar, 1898) (E. Papua); *D. keyensis* Kevan, 1970 (Key and Aru Is.); *D. marginata* (Bolívar, 1898) [= *D. miles* Rehn, 1951] (d'Entrecasteaux Is., extreme SE. Papua, Louisiade Archipelago — Fig. 3); *D. prasina* (Bolívar, 1905) (New Ireland, Tabar Is., Lavongai); *D. sundaica* (Rehn, 1909, *nec auctt.*) (W. and C. West New Guinea; Key and Aru Is.; a re-examination of the holotype indicates

³ Doubtfully recorded, presumably based on faulty data, from Borneo (Sarawak) and Philippine Is. (Mindanao) by Kevan (1966 b). A re-examination of the lectotype of *D. biroi* shows it to be conspecific with material assigned to that species by Ramme (1941) and not with the latter author's *D. buergersi*, contrary to the statement of Kevan (1963) — see Kevan (1970) — D. K. K.

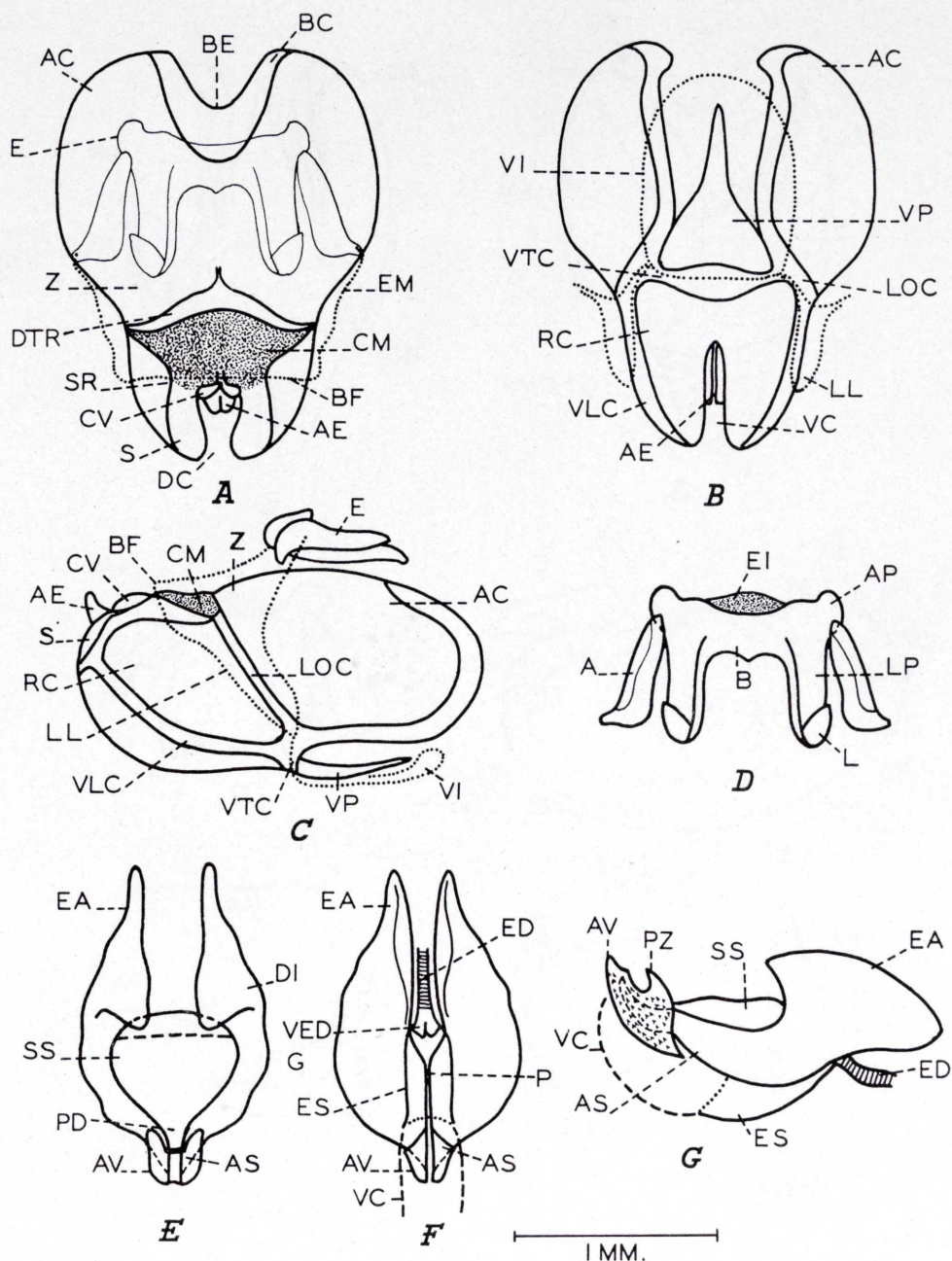


Fig. 1.—*Desmopterini* (*Desmopterina*): *Desmopterella angustata* Ramme, phallic structures. A, phallic complex, dorsal; B, the same, ventral; C, the same from the right; D, epiphallus, dorsal; E, endophallus, dorsal; F, the same, ventral; G, the same, from the right. For notation, see pp. 223-225.

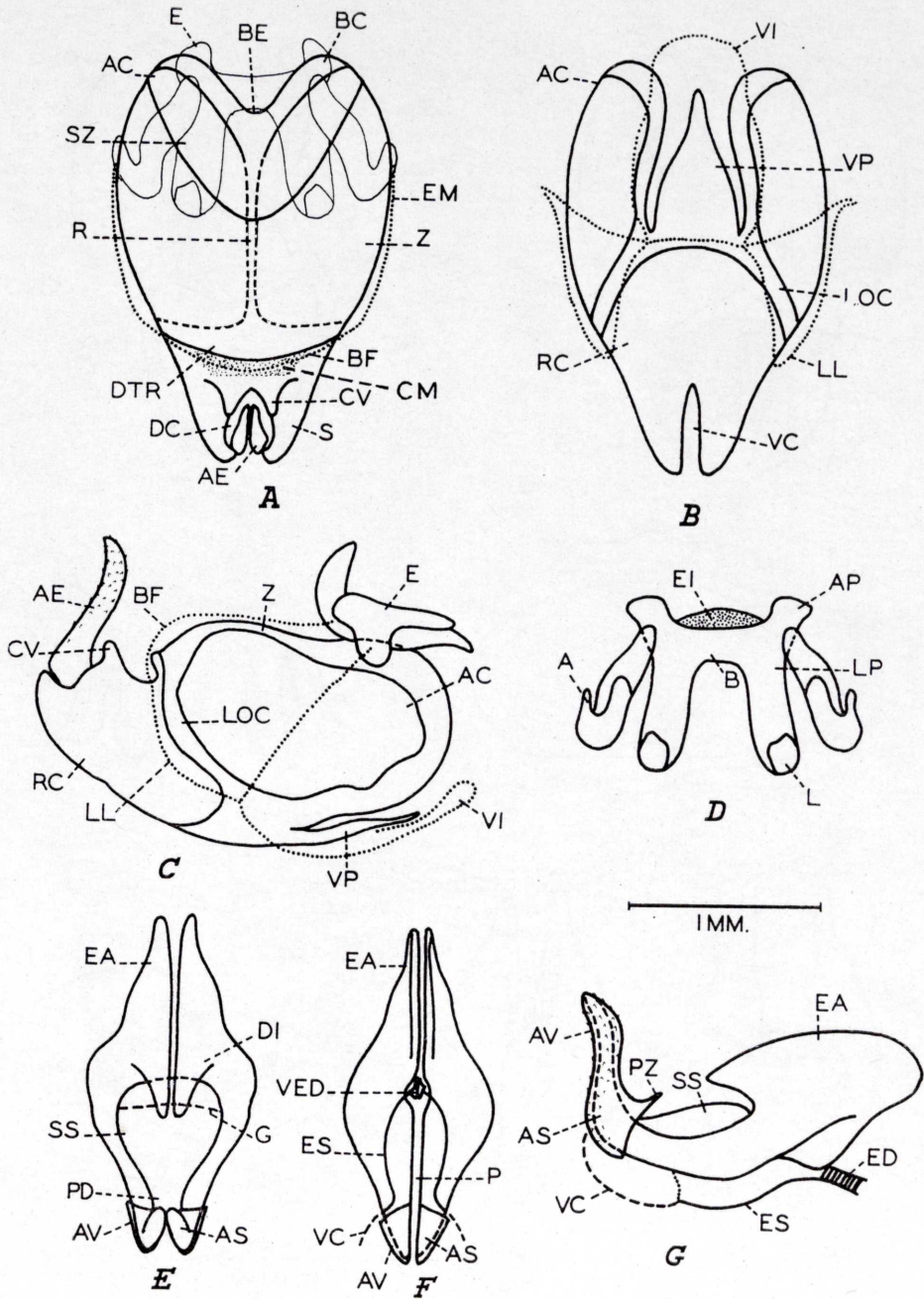


Fig. 2.—*Desmopterini* (*Desmopterina*): *Desmopterella buergersi* Ramme, phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

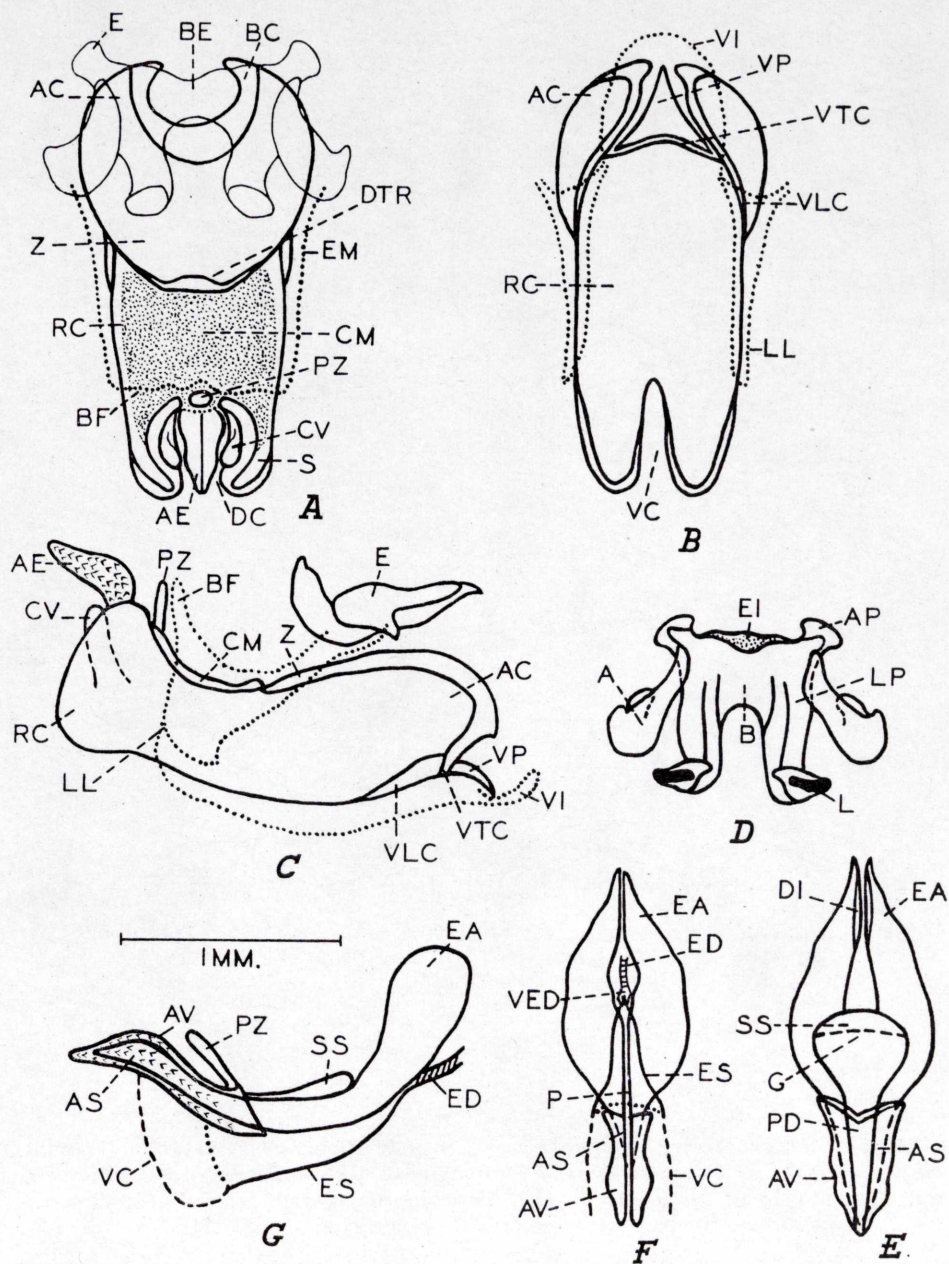
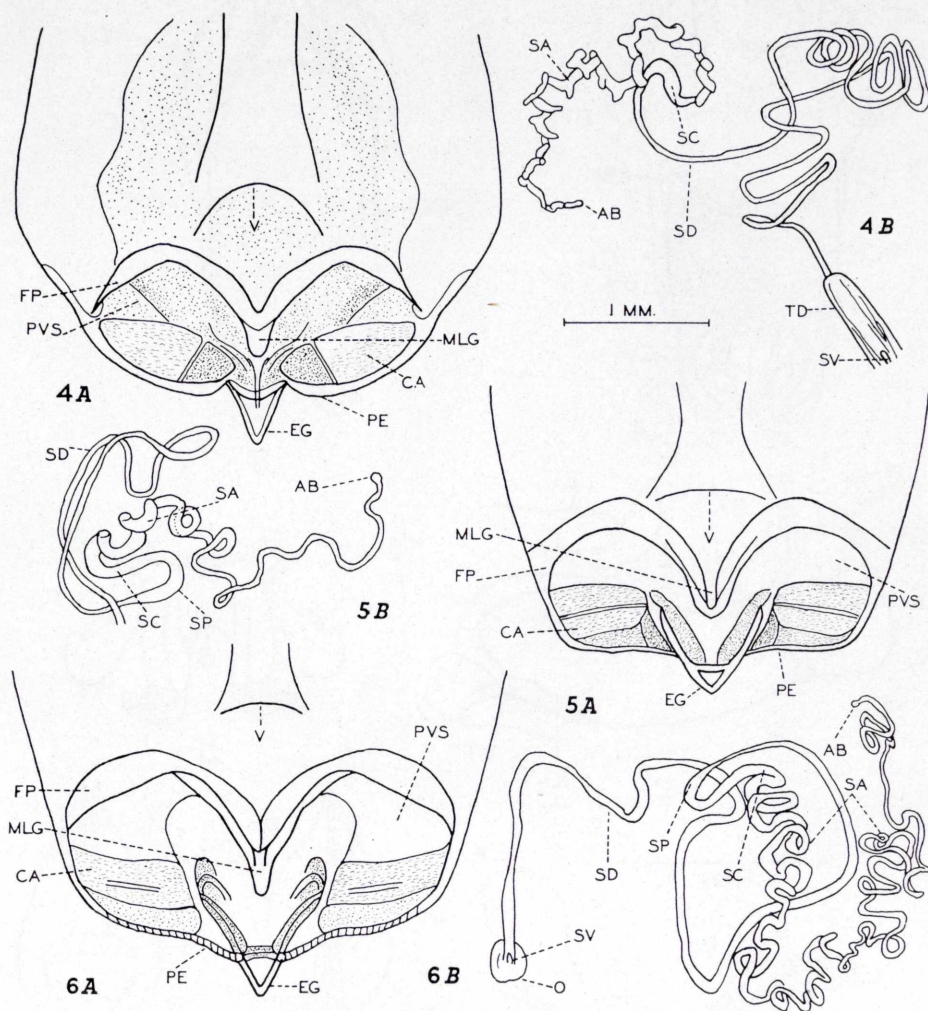


Fig. 3.—*Desmopterini* (*Desmopterina*): *Desmopterella marginata* (Bolívar), paratype of *D. miles* Rehn, phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.



Figs. 4-6.—*Desmopterini* (*Desmopterina*), female structures: 4) *Desmopterella bironi* (Bolivar); 5) *Desmoptera* (*Platydesmoptera*) *degenerata degenerata* Brunner von Wattenwyl; 6) *Desmoptera* (*D.*) *novaeguineae* (Haan). *A*, subgenital plate, dorsal; *B*, receptaculum seminis. For notation, see pp. 223-225.

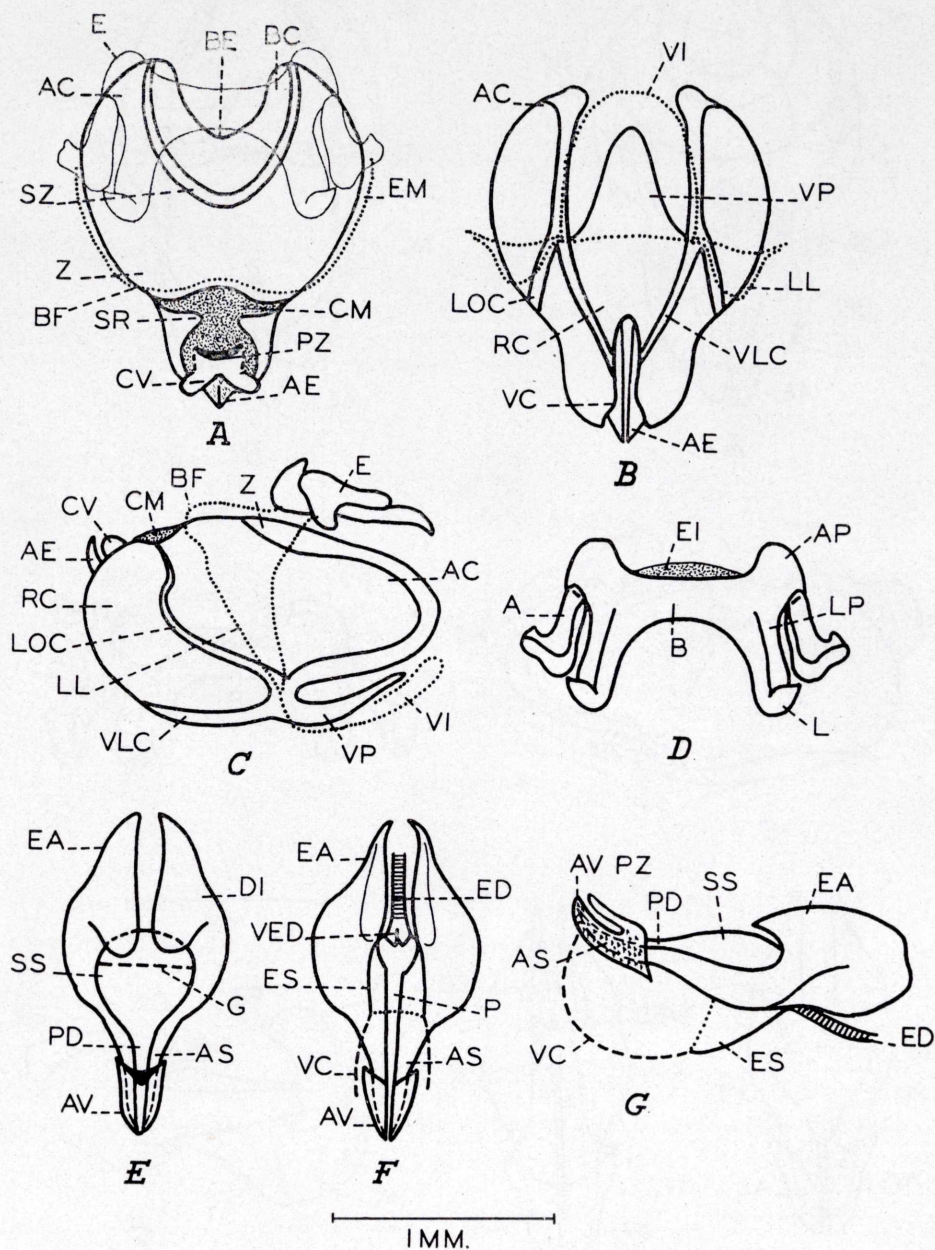


Fig. 7.—*Desmopterini (Desmopterina): Desmoptera (Platydesmoptera) degenerata* Brunner von Wattenwyl, phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

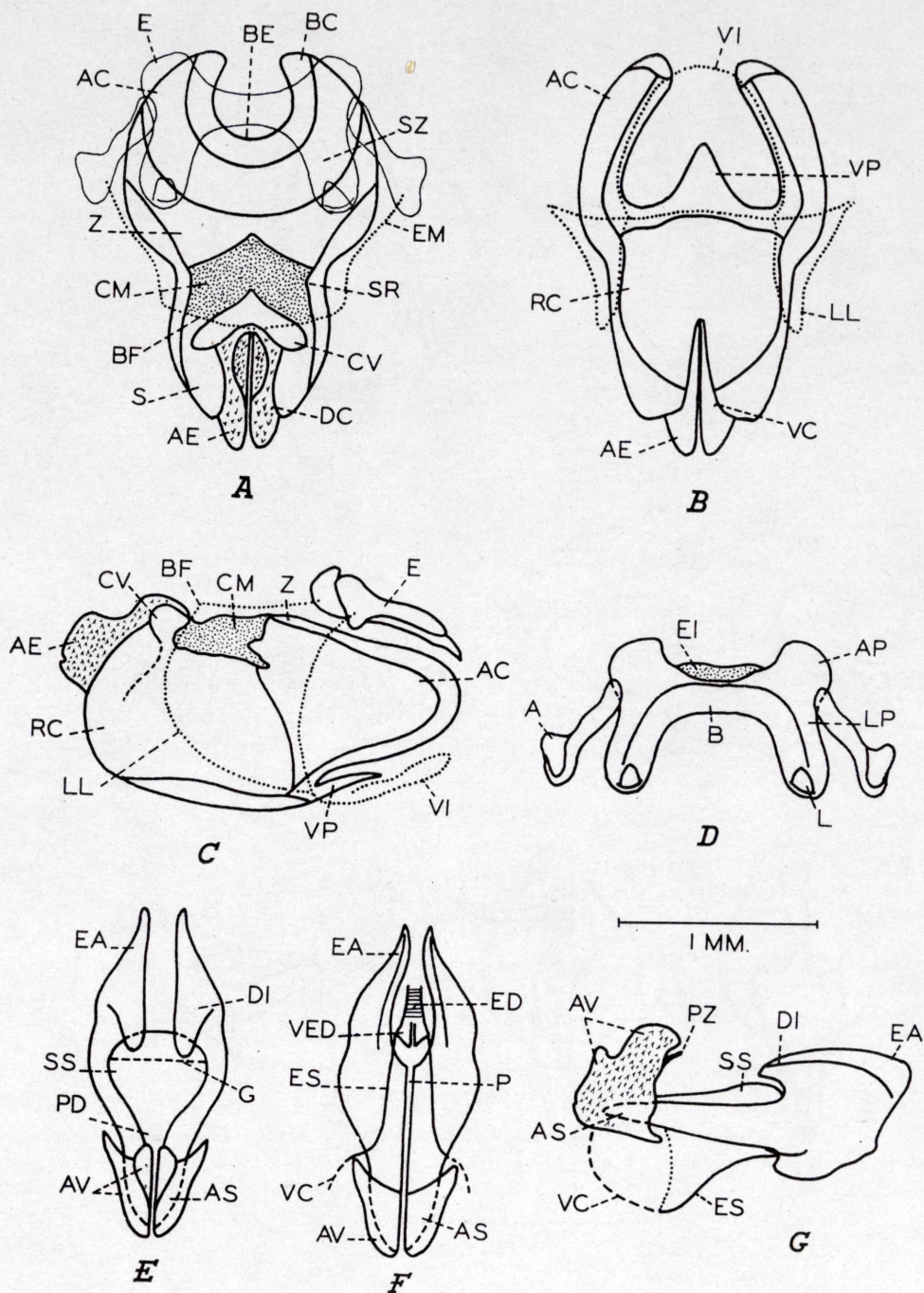


Fig. 8.—*Desmopterini* (*Desmopterina*): *Desmoptera* (*D.*) *judicata* Bolivar, phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

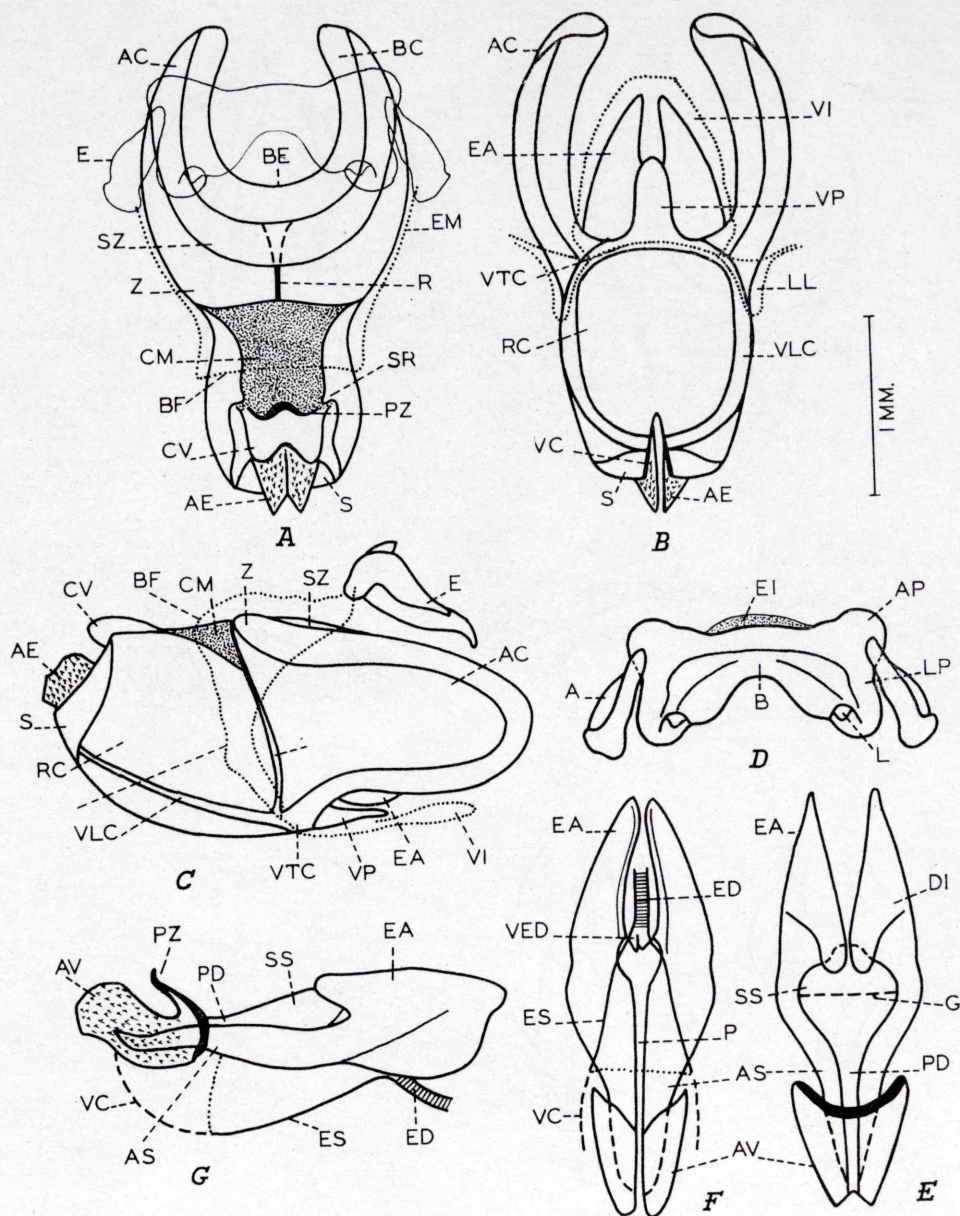


Fig. 9.—*Desmopterini* (*Desmopterina*): *Stenoxiphula excisa* (Ramme), paratype, phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

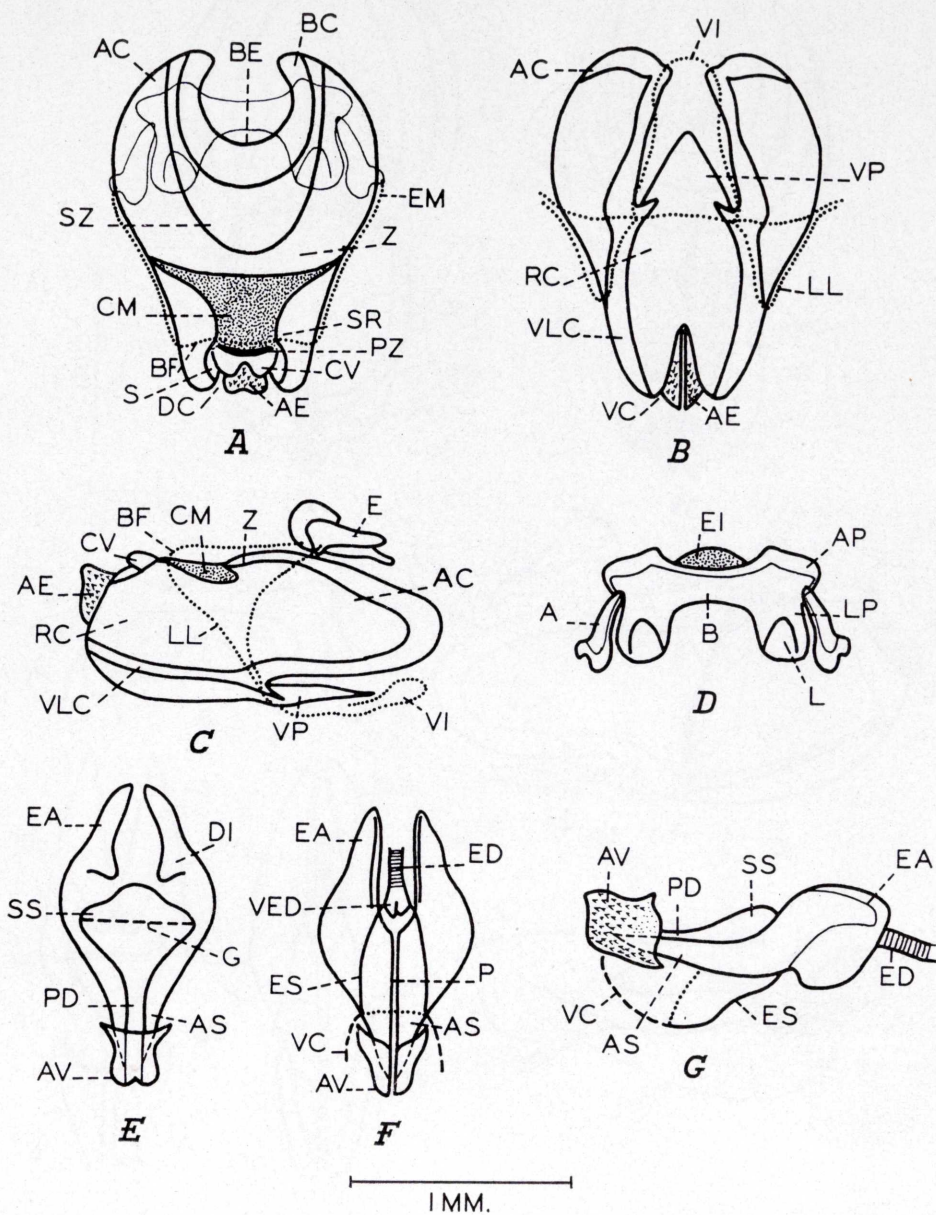


Fig. 10.—*Desmopterini* (*Desmopterina*): *Stenoxypheilus brachypterus* Ramme, phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

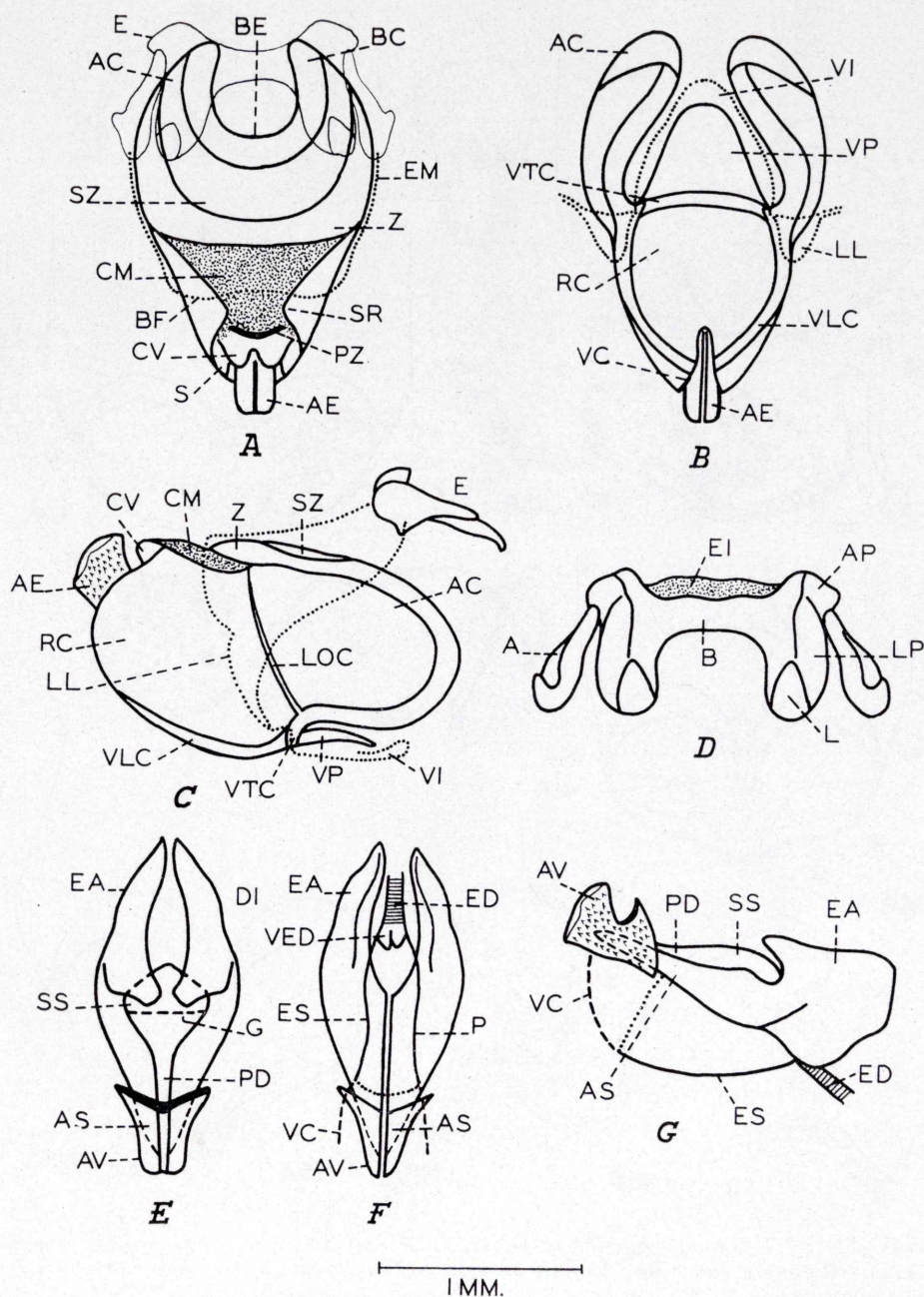
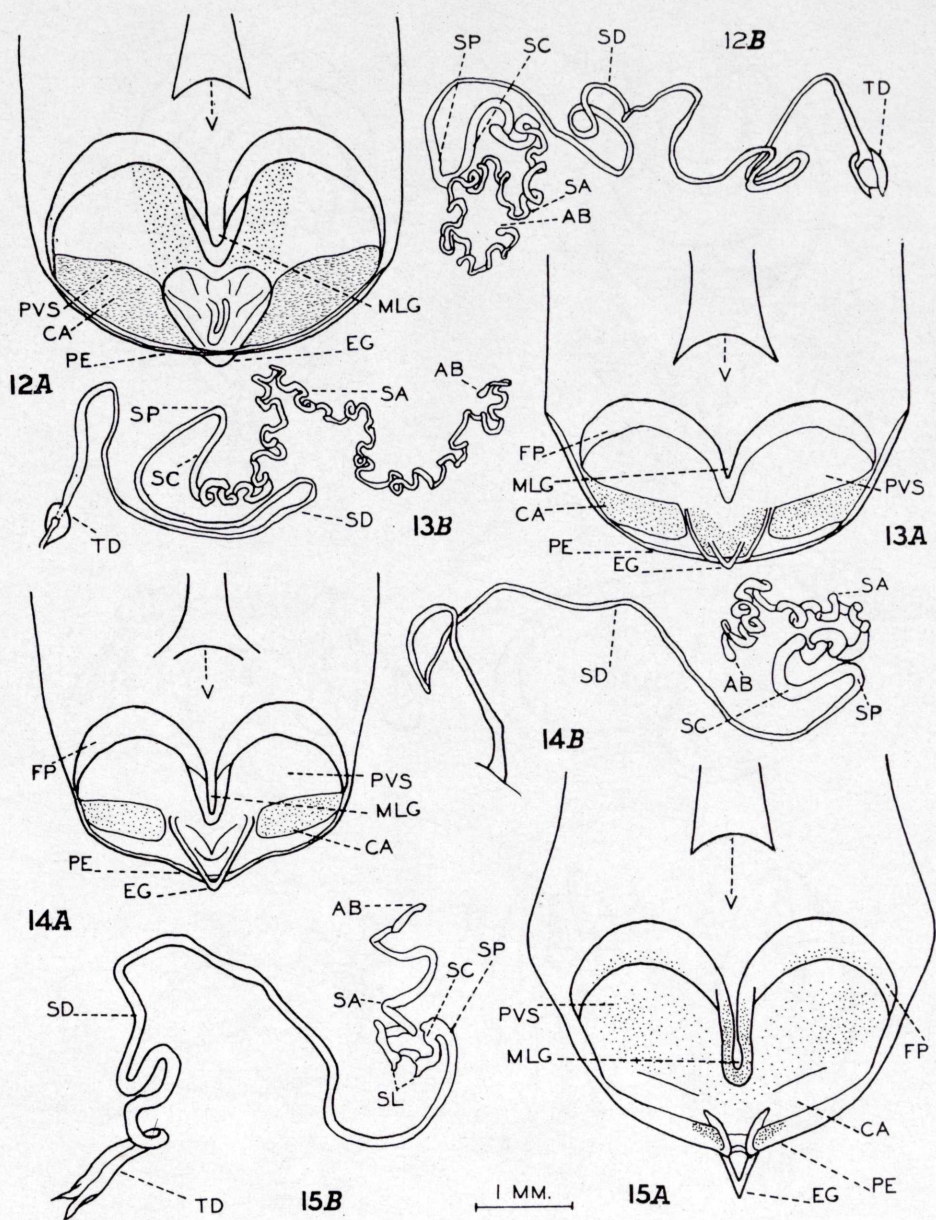


Fig. 11.—*Desmopterini* (*Desmopterina*): *Stenoxypus variegatus* (Blanchard), phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.



Figs. 12-15.—*Desmopterini* (*Desmopterina*), female structures: 12) *Stenoxiphula excisa* (Ramme), paratype; 13) *Stenoxiphallus brachypterus* Ramme; 14) *Stenoxiphus variegatus* (Blanchard); 15) *Doriaella cinnabarina* Bolivar. A-B, as in Figs. 4-6. For notation, see pp. 223-225.

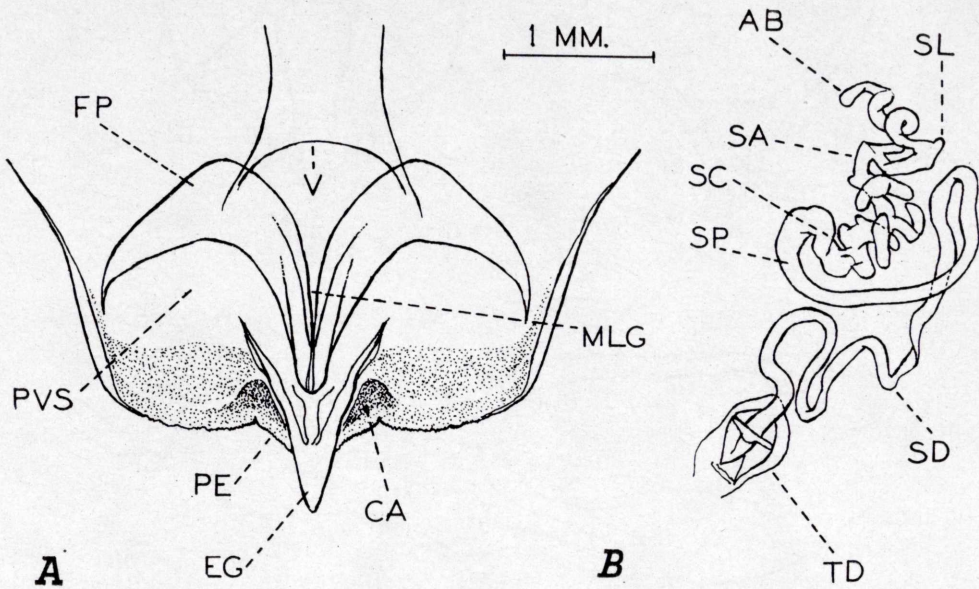


Fig. 15 a.—*Desmopterini* (*Desmopterina*): *Paradoriaella tuberculata* Willemse, female structures. A-B, and notation, as in Fig. 15.

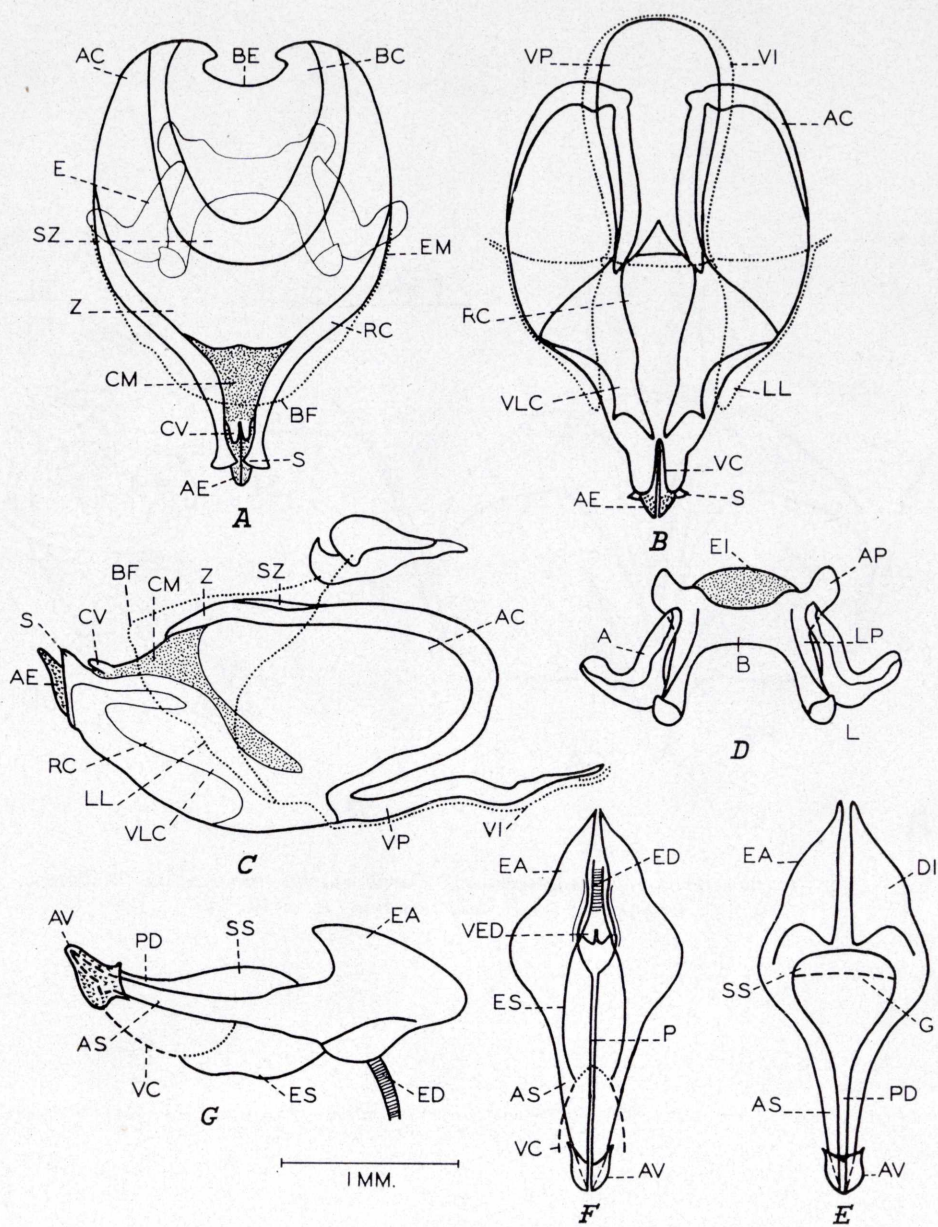


Fig. 16.—*Desmopterini* (*Desmopterina*): *Doriaella cinnabarina* Bolívar, phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

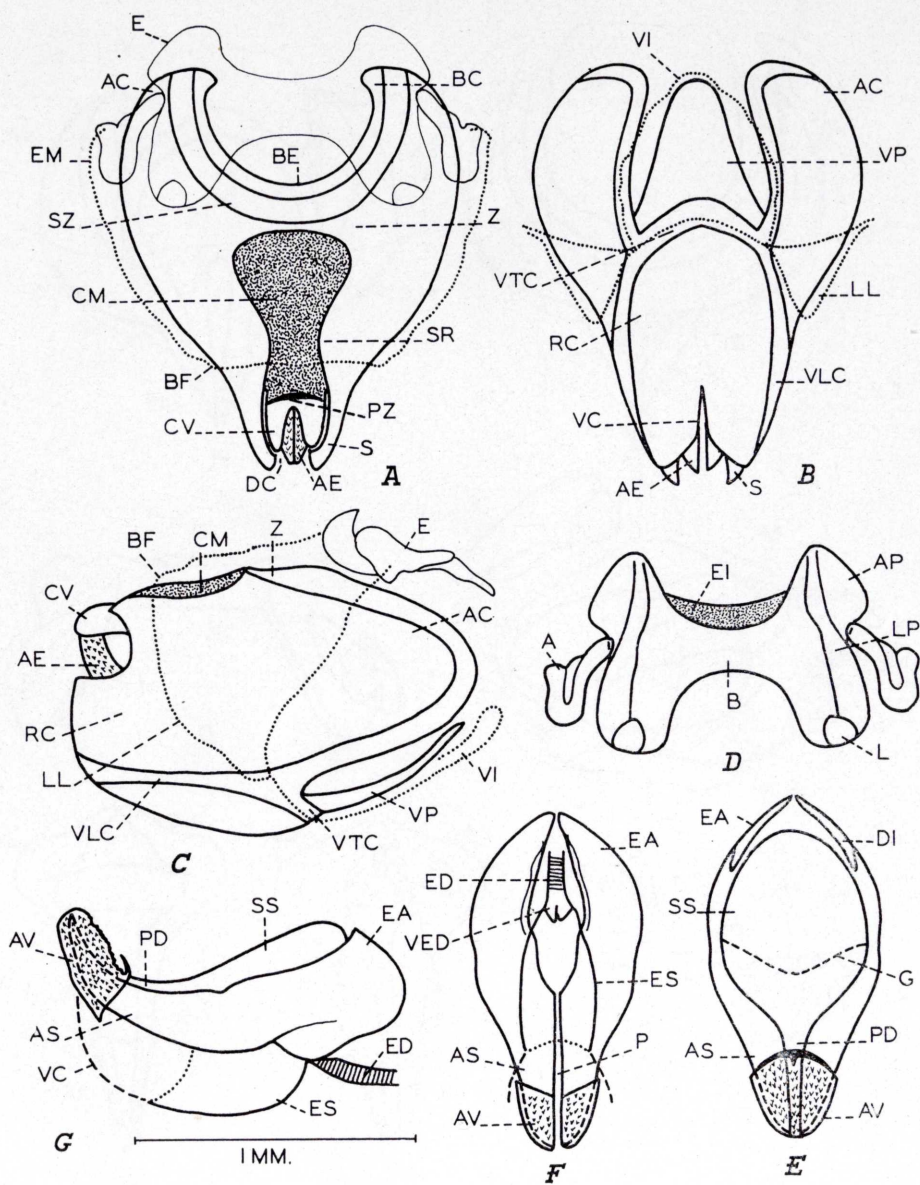


Fig. 17.—*Desmopterini* (*Desmopterina*): *Menesiella weylandi occulta* (Rehn), phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

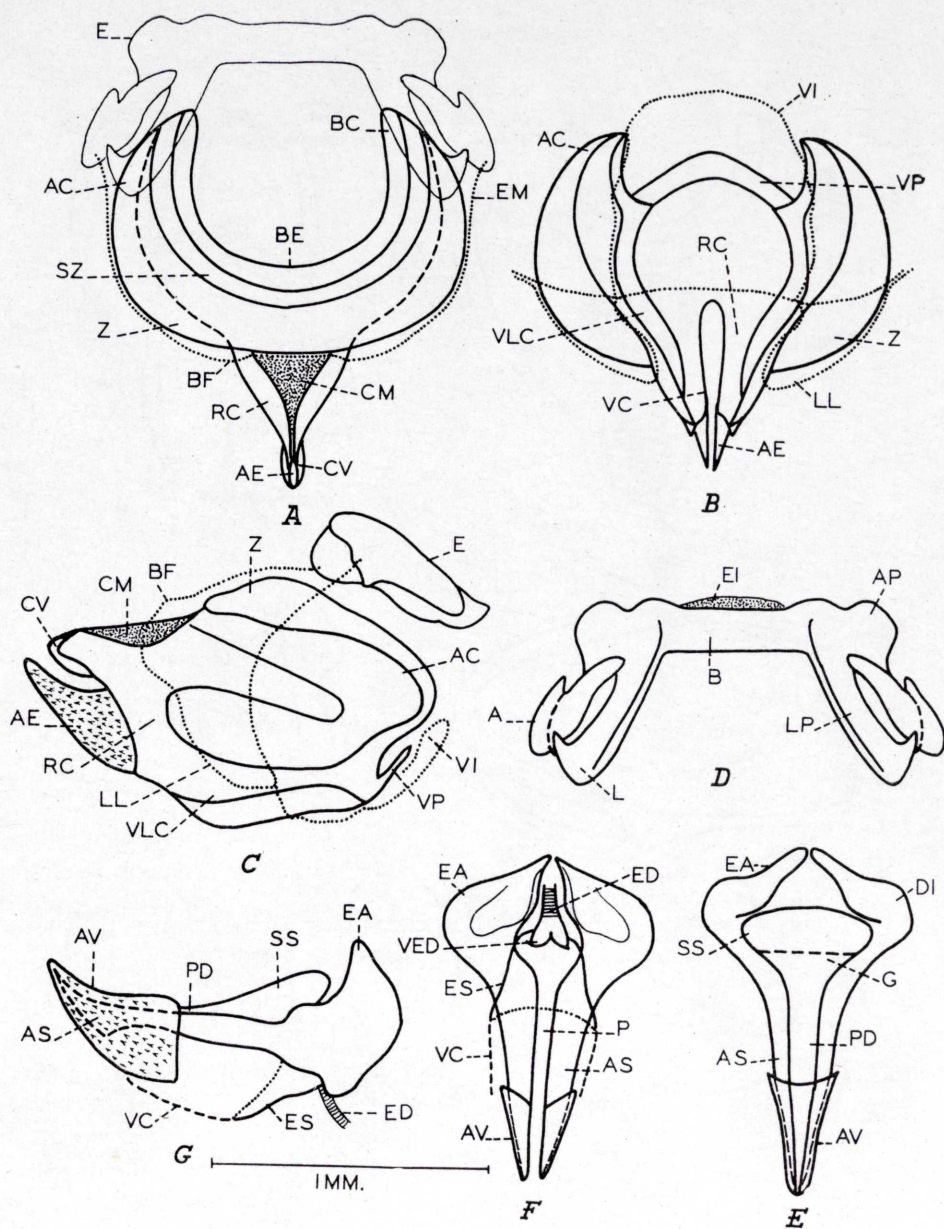
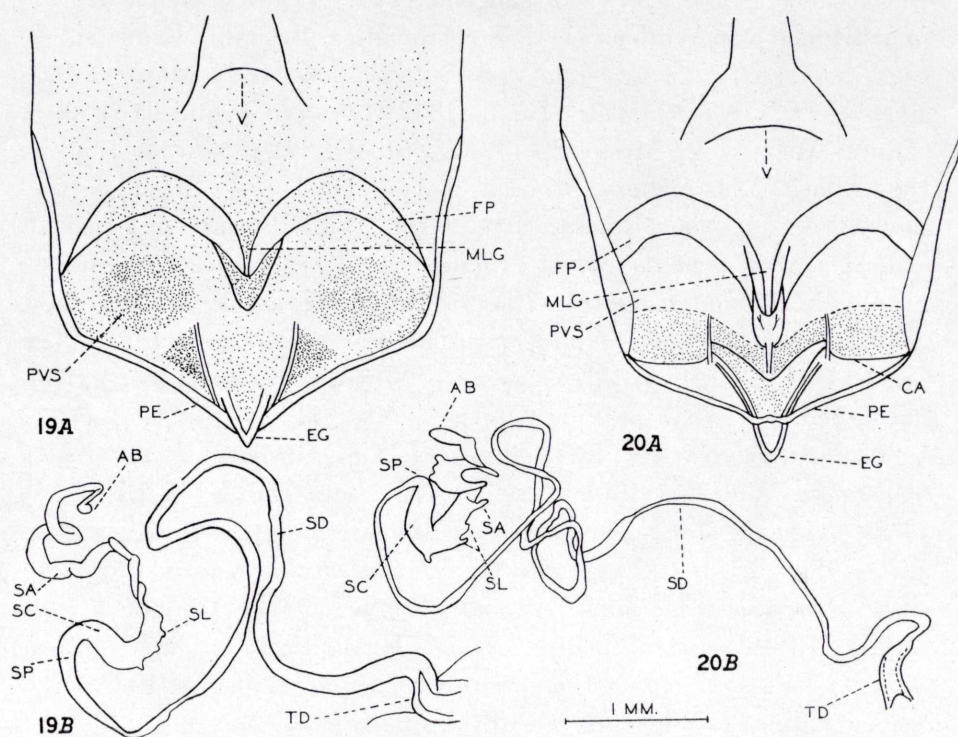


Fig. 18.—*Desmopterini* (*Desmopterina*): *Menesia novaeguineae* Willemse, phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.



Figs. 19-20.—*Desmopterini* (*Desmopterina*), female structures: 19) *Menesiella weylandi occulta* (Rehn); 20) *Menesia novaeguineae* Willemse. A-B, as in Fig. 1. For notation, see pp. 223-225.

that this is not an Australian species; includes subsp. *steini* Ramme, 1941 from southern and eastern parts of species range — see Kevan (1970)]; *D. sylvatica* (Montrouzier, 1855) (Woodlark I.); *D. willemsei* Kevan, 1970 (NE. West New Guinea, NW. Northeast New Guinea); *Desmoptera* (*Platydesmoptera*) *truncatipennis* Sjöstedt, 1920 (N. Queensland) [Type species of subgenus]; *D. (P.) degenerata degenerata* Brunner von Wattenwyl, 1898 (Halmahera, Batjan, Talaud Is. ⁴ — Figs. 5, 7); *D. (P.) d. molucensis* Bolívar, 1905 (Obi Major); *Desmoptera* (*D.*) *novaeguineae* (Haan, 1842) (western peninsula of New Guinea, Waigeu I., Misool I. — Fig. 6); *D. (D.) judicata* Bolívar, 1884 (Batjan, Halmahera, Morotai, Talaud Is. — Fig. 8) [Type species]; *D. (D.) analis* Ramme, 1941 (Obi Major, Batjan, S. [?] Halmahera); *Stenoxypheula excisa* (Ramme, 1941) (NE. New Guinea — Figs 9, 12) [Type species]; *S. microphallica* Kevan, 1966 (NE. New Guinea); *Stenoxypheulus brachypterus* Ramme, 1941 (N. and NE. New Guinea — Figs. 10, 13) [Type species]; *Stenoxypheus variegatus* (Blanchard, 1853) (W. half of New Guinea — Figs. 11, 14) [Type species]; *S. aurantiacus* (Karsch, 1896) (most of New Guinea); *Paradoriaella tuberculata* Willemse, 1961 (N. C. to E. New Guinea — Fig. 15 a) [Type species]; *Doriaella cinnabarina* Bolívar, 1889 (most of New Guinea — Figs. 15, 16) [Type species]; *D. cheesmanae* Kevan, 1966 (Papua); *Menesesiella weylandi weylandi* (Ramme, 1941) (W. half of New Guinea) [Type species]; *M. w. occulta* (Rehn, 1951) (E. half of New Guinea — Figs. 17, 19); *Menesesia novaeguineae* Willemse, 1922 (most of New Guinea — Figs. 18, 20) [Type species].

Other included species: *Stenoxypheus expansus* Kevan, 1963 (Japan I.).

Recent revisional work on members of this subtribe other than *Desmopterella* will be found in Kevan (1963, 1966 a, 1966 b). *Desmopterella* has recently been revised completely by Kevan (1970). The work of Ramme (1941), is now quite obsolete.

The first published information on the concealed copulatory structures was that of Slifer (1940) who figures the spermatheca of *Stenoxypheus* sp. [*S. aurantiacus*]. Dirsh (1956) illustrates the epiphallii of *Desmoptera* [(*Platydesmoptera*) *degenerata*] *molucensis* and *Stenoxypheus aurantiacus*. Kevan (1966 a) illustrates the copulatory structures

⁴ Erroneous and dubious records from elsewhere are referred to by Kevan (1963).

(both sexes except as indicated) for *Desmoptera* (*Platydesmoptera*) *truncatipennis* (male), *D. (P.) degenerata degenerata*, *D. (D.) novae-guineae*, *D. (D.) judicata* (male), *D. (D.) analis* (male), *Stenoxypula excisa*, *S. microphallica*, *Stenoxypus variegatus*, *S. aurantiacus*, *Doriaella cinnabarina*, *D. cheesmanae* (female), *Menesesiella weylandi weylandi* (male) and *M. w. occulta* (male). Some of his figures are reproduced here in modified form. Figures of the epiphalli and endophalli of *Desmopterella biroi*, *D. dahli* and *D. prasina* are given by Kevan (1966 b). Kevan (1970) illustrates the concealed copulatory structures of all species *Desmopterella* (both sexes, except for *D. sylvatica*, of which only the female is known).

Subtribe b. APODESMOPTERINA nov.

(Figs. 21-24).

External features: Foveolae occupying two-thirds of the dorsal area of the fastigium of the vertex; tegmina, when fully developed, bearing apical points towards the anterior margins, gradually narrowed towards base, main veins with reduced nodules.

Principal phallic characters: Epiphallus with anterior projections pointed; ectophallus with rami of cingulum (which may be very long or very short) close together and subparallel apically, ventral process narrow and blunt (long or short); endophallus with aedeagal sclerites highly specialized (dorsal inflections of endophallic apodemes very large and 'hairy', or aedeagal sclerites very long and slender and protruding beyond the aedeagal valves), aedeagal valves scarcely denticulate and of rather simple (even if elongate) form.

Concealed female structures: Subgenital plate with posterior edge concave on either side of the egg-guide, main anterior contact areas rounded or quadrate; spermatheca with a subapical, inflated caecum-like structure which probably incorporates the true caecum and a shortened, enlarged appendage.

Distribution: Philippines.

Included genus: *Apodesmoptera* Rehn, 1951 (including subgenus *Brachydesmoptera* Kevan, 1966).

Species examined: *Apodesmoptera (Brachydesmoptera) luzonica* Kevan, 1963 (SW. Luzon — Figs. 21, 23) [Type species of subge-

nus]; *A. (A.) curtippennis* Kevan, 1966 (SE. Luzon); *A. (A.) mira* Rehn, 1951 (SE. Philippines — Figs. 22, 24) [Type species].

Other species: None known.

The most recent treatment of this group is that of Kevan (1966 b), who illustrates the copulatory structures of both sexes for all species. Some of his figures are repeated here in modified form.

It may be noted that the least specialized member of this subtribe, *A. (A.) curtippennis*, shows certain phallic resemblances to *Menesesella*, that the spermathecal appendage of *Menesia novaeguineae*, if simplified and inflated apically would be not unlike that of *A. (A.) curtippennis*, and that the female subgenital plates of the two species are not altogether dissimilar. These facts, together with similarities in external morphology (notably the anteriorly-placed mucro on the tegminal apex and the form of the head and pronotum) between *Apodesmoptera*, *Menesia* and *Menesesiella* suggest that all three are derived from a common origin and that *Apodesmopterina* are derived from Papuan ancestors.

TRIBE 17. MONISTRIINI.

(Figs. 25-35; Pls. II-VI, VII, figs. A-F, IX, figs. H-K).

[Fam. *Acrididae*] Limited Fam. *Phymat[e]idae* Walker, 1870, *Cat. Derm. Salt. Brit. Mus.*, III, 539 (*partim*) [includes *Petasida*]; 1871, *Ibid.*, V, (Suppl. 3), 101 (*partim*) [as last].

Sub-tribus [and sub-tribu] *Poecilocerae* Bolívar, 1884; *An. Soc. esp. Hist. nat.*, XIII, 20, 24, 447 (*partim*).

Subfam. *Poecilocerinae* Bolívar, 1904, *Bol. Soc. esp. Hist. nat.*, IV, 432 (*partim*).

Sect. *Poeciloceri* Bolívar, 1909, *Gen. Ins.*, XC, 4, 20 (*partim*) [see also Kevan & Akbar, 1964, *Canad. Ent.*, XCVI, 1511, fig. 3 (map) (*partim*)].

Tribe *Poecilocerni* Rehn, 1953, *Trans. Amer. ent. Soc.*, LXXIX, 100 (*partim*); 1953, *Grassh. Locusts Austral*, II, 21, 24, 25, 26, 52, 53, 54 (*partim*); Kevan, 1957, *Opusc. ent.*, XXII, 199 (*partim*); [Čeled' *Acrididae*]. Podčeled' *Oedipodinae* Ohenberger, 1955, *Entomologie*, Praha, II, 324 (*partim*) [*Monistria*].

Tribe *Monistriini* Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1509, fig. 2 (map), 1521, 1525; Key, 1969, *Aust. J. Zool.*, XVII, 353, 412; Kevan, Akbar and Chang, 1969, *Eos*, Madrid, XLIV (1968), 219, 220; 1970, *Ibid.*, XLV (1969), 176.

External features. Body usually of moderate to fairly large size, generally rather heavily built, fusiform to rather short and robust (sub-

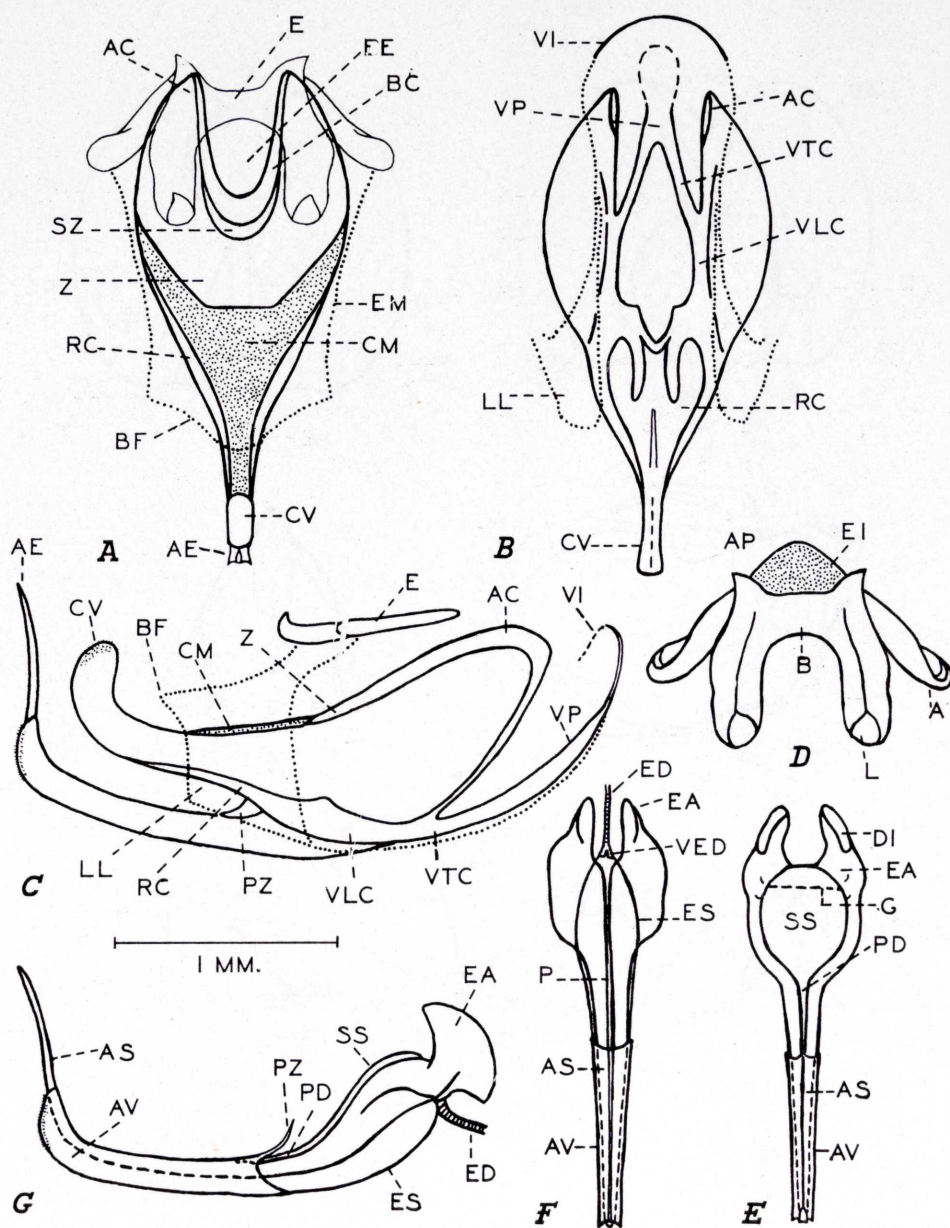


Fig. 21.—*Desmopterini (Apodesmopterina)*: *Apodesmoptera (Brachydesmoptera) luzonica* Kevan, phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

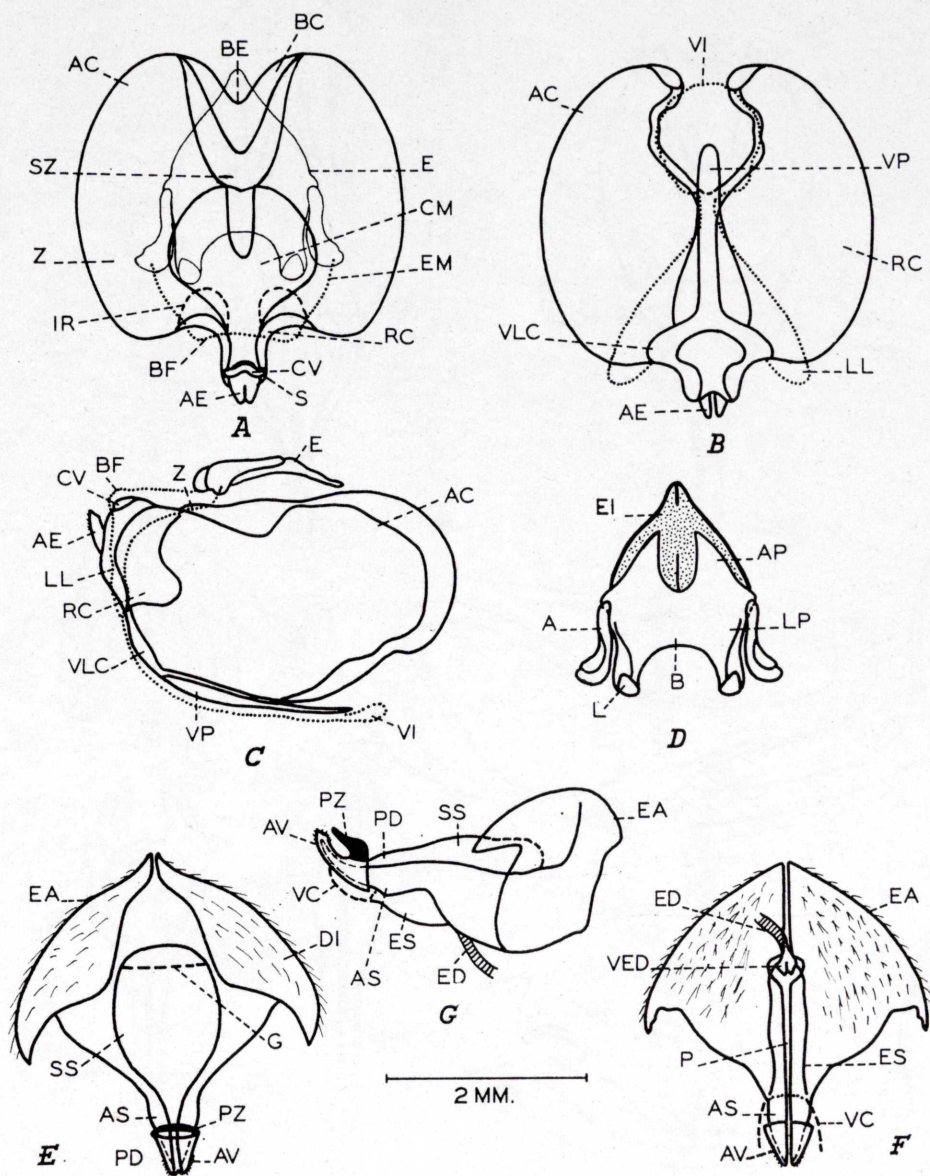
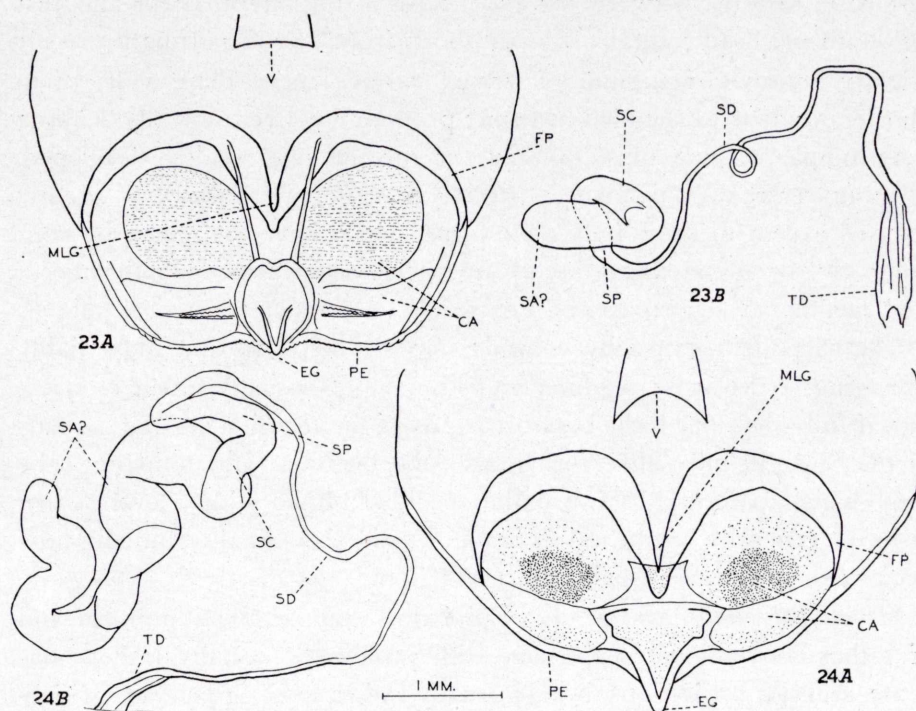


Fig. 22.—*Desmopterini* (*Apodesmopterina*): *Apodesmoptera* (*A.*) *mira* Rehn, phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.



Figs. 23-24.—*Desmopterini* (*Apodesmopterina*), female structures: 23) *Apodesmoptera* (*Brachydesmoptera*) *luzonica* Kevan, holotype; 24) *A. (A.) mira* Rehn. A-B, as in Figs. 4-6. For notation, see pp. 223-225.

fusiform, especially in female); integument strongly rugose or beset with at least a few granular tubercles and often with raised pustules, general coloration usually dark, speckled and otherwise marked with reddish orange to pale yellowish, or the reverse; antennae with basal segments at least as long as wide, subfiliform or slightly flattened at the base, inserted between the eyes, close to the lateral ocelli and just below them; head conical to rather short, frontal profile straight or only slightly concave; fastigium of vertex rarely longer than wide, often shorter, angular to rounded in front; pronotum convex dorsally, lacking longitudinal carinae or with only the median one weakly developed, all transverse sulci distinct, posterior margin subtruncate or slightly excised except in some fully alate forms which have the metazona considerably, or even exaggeratedly produced backwards over the meso- and metanota; sternal lamina crossed by a distinct prosternal suture; prosternal tubercle usually conical; mesosternal lobes not appreciably diverging backwards; tegmina and hind wings usually much reduced, but, if fully developed, the costal margins of the tegmina are not sinuous at the base; in fully alate forms, also, the tegmina (and sometimes the hind wings partially) are usually speckled; hind wings, even when reduced, generally bright red to orange; male abdominal terminalia unspecialized; ovipositor usually short and stout.

Principal phallic characters: Epiphallus comparatively uniform and of rather conventional shape, but with prominent, usually rather quadrate, anterior projections, bridge usually rather stout, appendices widely divergent, lateral plates generally rather short and divergent, lophi short, stout, apical hooks laterally directed; ectophallus pear-shaped or subspherical with a stout 'tail', central membrane rather extensive to somewhat narrowly restricted, zygoma broad, usually extending nearly to or beyond the middle of the cingulum, its posterior margin varying from slightly excavate or sinuous to weakly convex, suprazygomal plate rather extensive, usually broad, nearly reaching or surpassing the posterior margin of the zygoma, basal emargination distinct, semicircular or subcircular, occasionally quite large, apodemal plates in lateral view rounded to somewhat pointed, traces of ventral processes sometimes indicated, valves of cingulum simple and inconspicuous, short and broad or absent, rami of cingulum narrow in dorsal view, of variable proximity, ventral process small, but of variable shape and width; aedeagal sclerites generally rather stout and straight, but sometimes prolonged and upwardly curved apically, apices undivided, endophallic apodemes

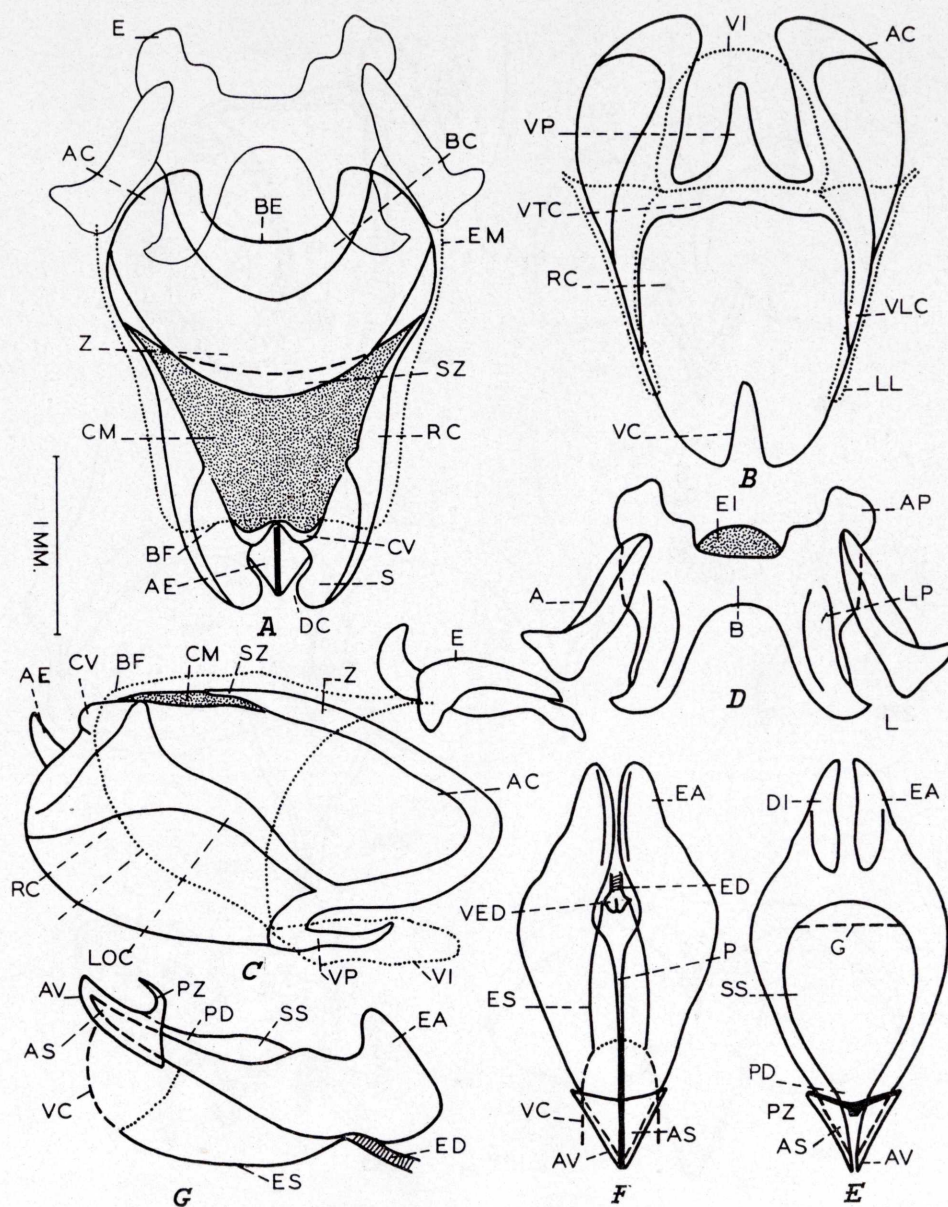
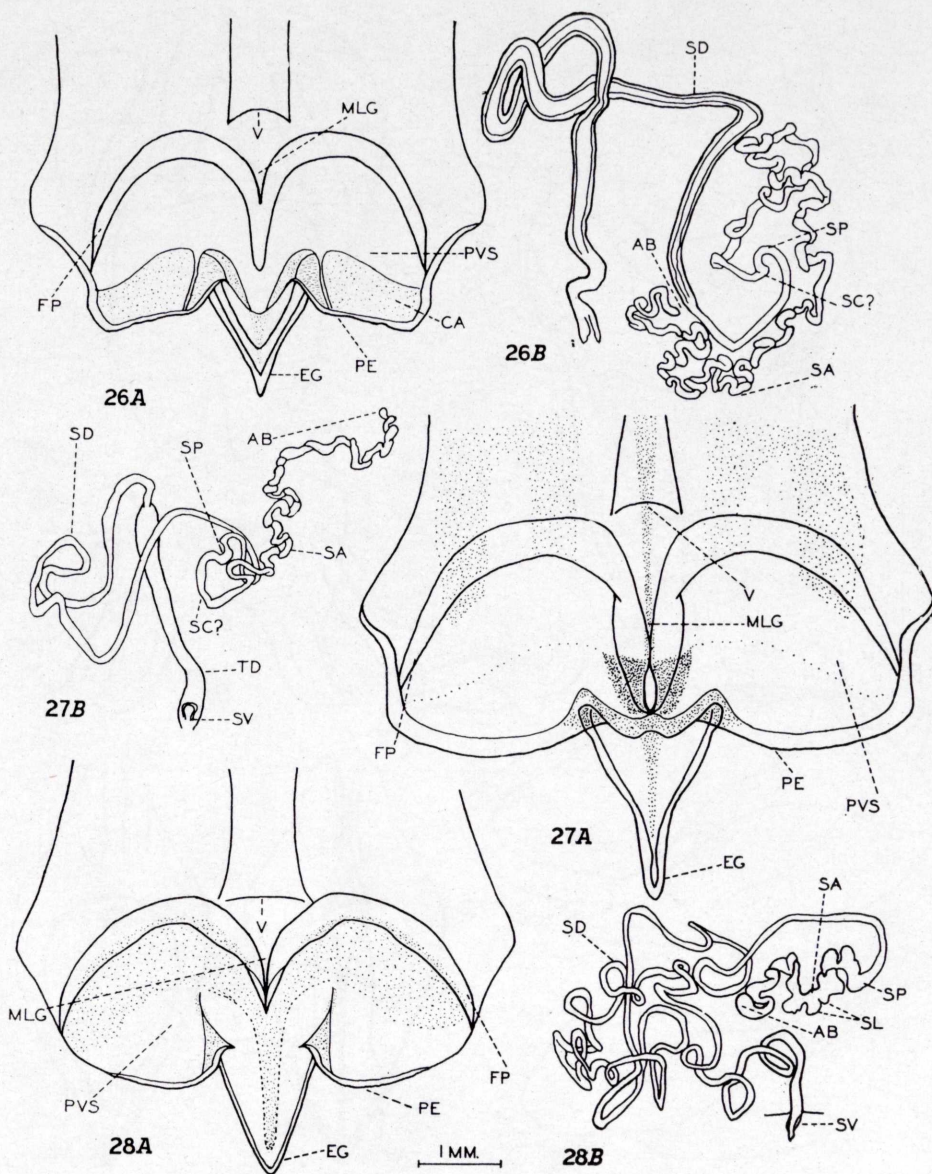


Fig. 25.—*Monistriini*: *Scutillia verrucosa* Sjöstedt, phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.



Figs. 26-28.—*Monistrini*, female structures: 26) *Scutilla verrucosa* Sjöstedt; 27) *Petasida ephippigera* White; 28) *Monistria (Greyacris) variolosa* (Rehn). A-B, as in Figs. 4-6. For notation, see pp. 223-225.

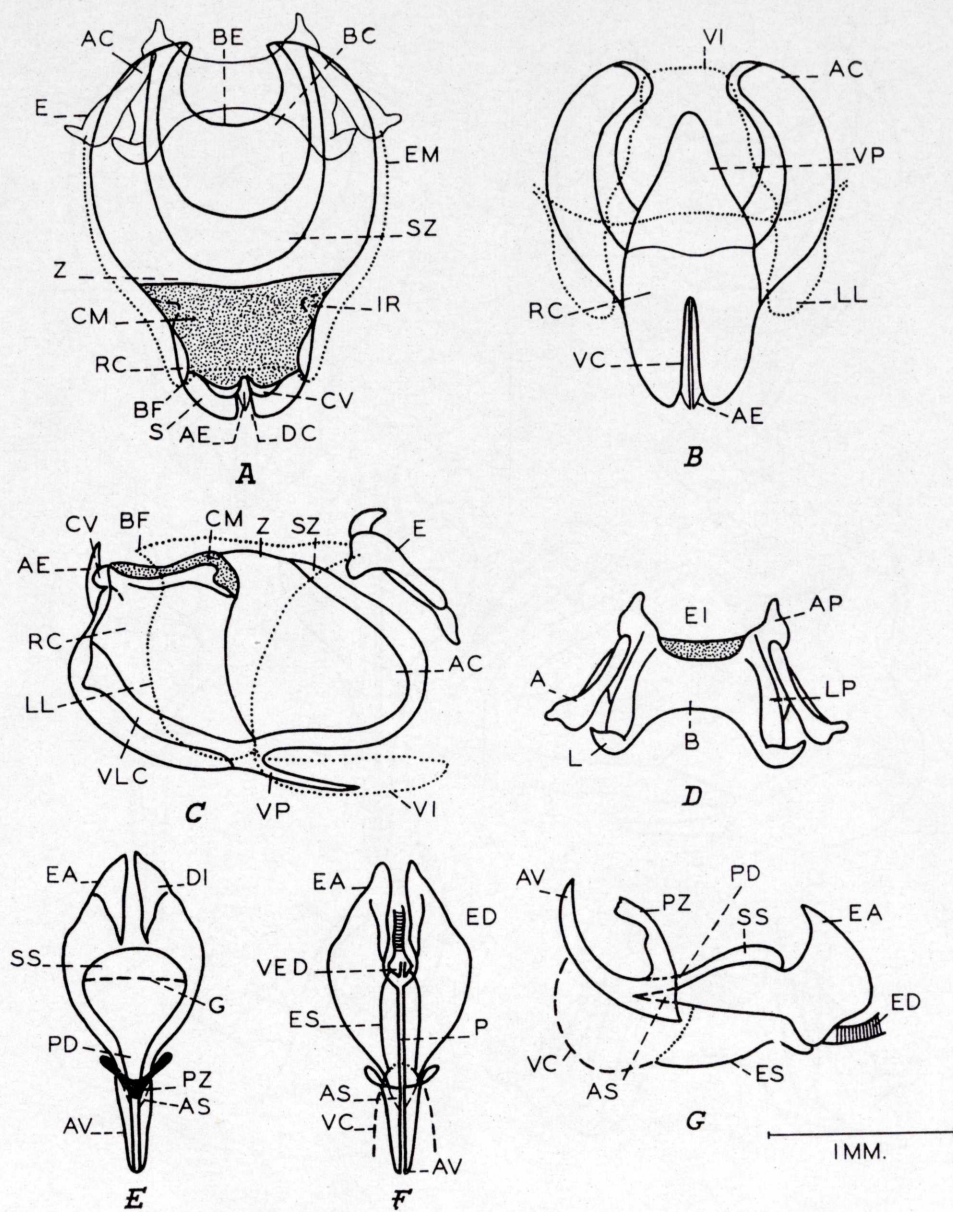


Fig. 29.—*Monistriini*: *Cygniterra maculicornis* (Sjöstedt), phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

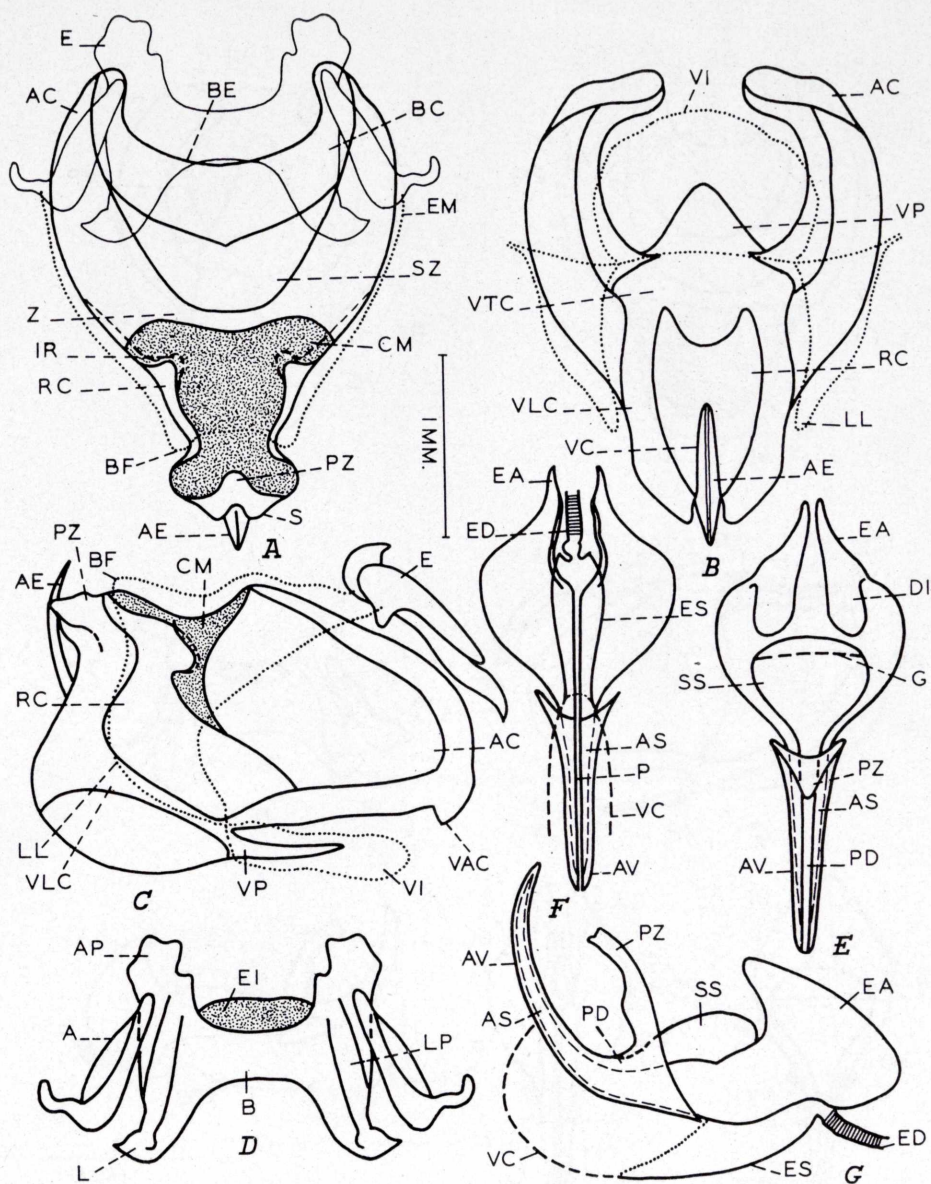


Fig. 30.—*Monistriini*: *Monistria (M.) concinna vinosa* Carl, phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

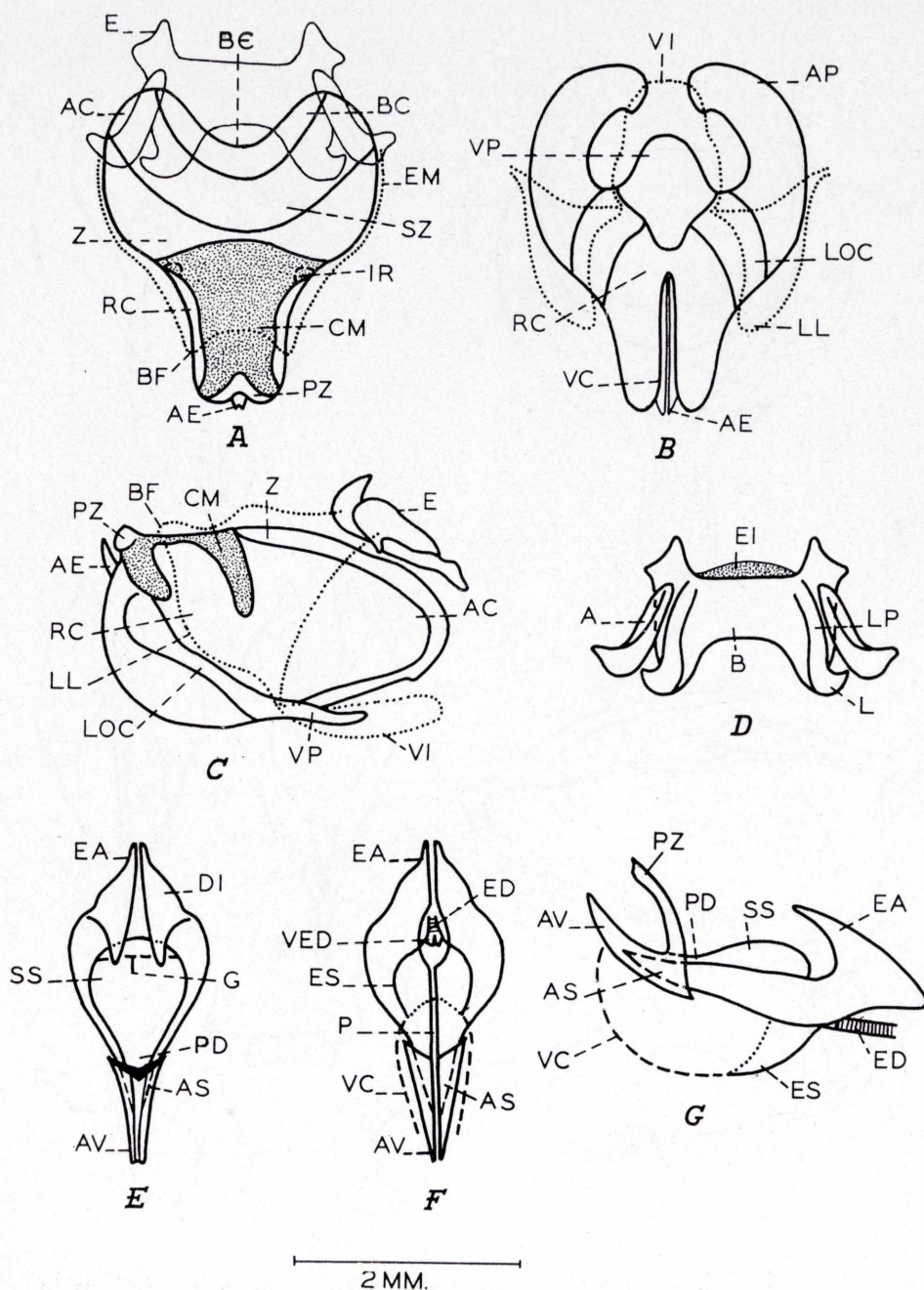


Fig. 31.—*Monistriini*: *Monistria (Greyacris) variola* (Rehn), phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

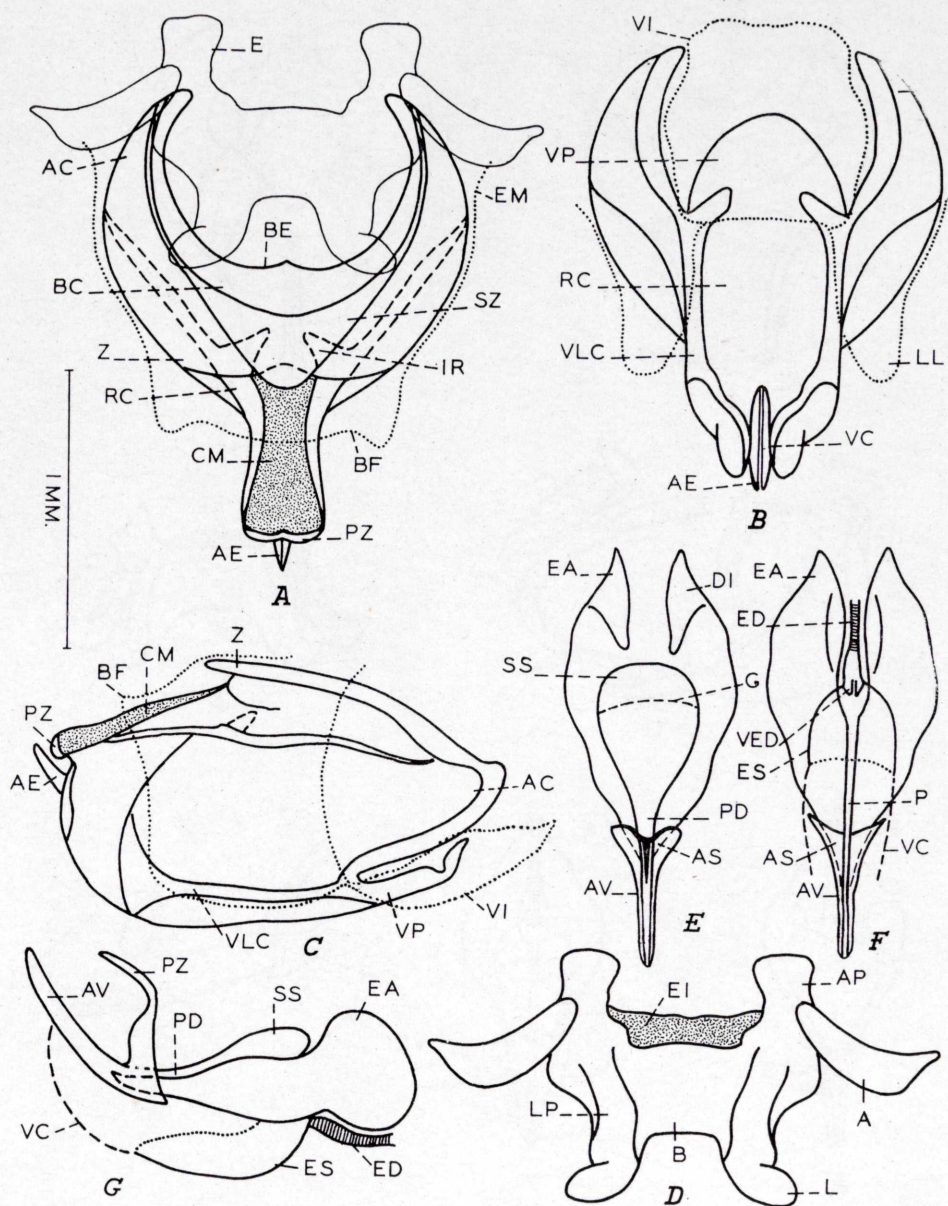
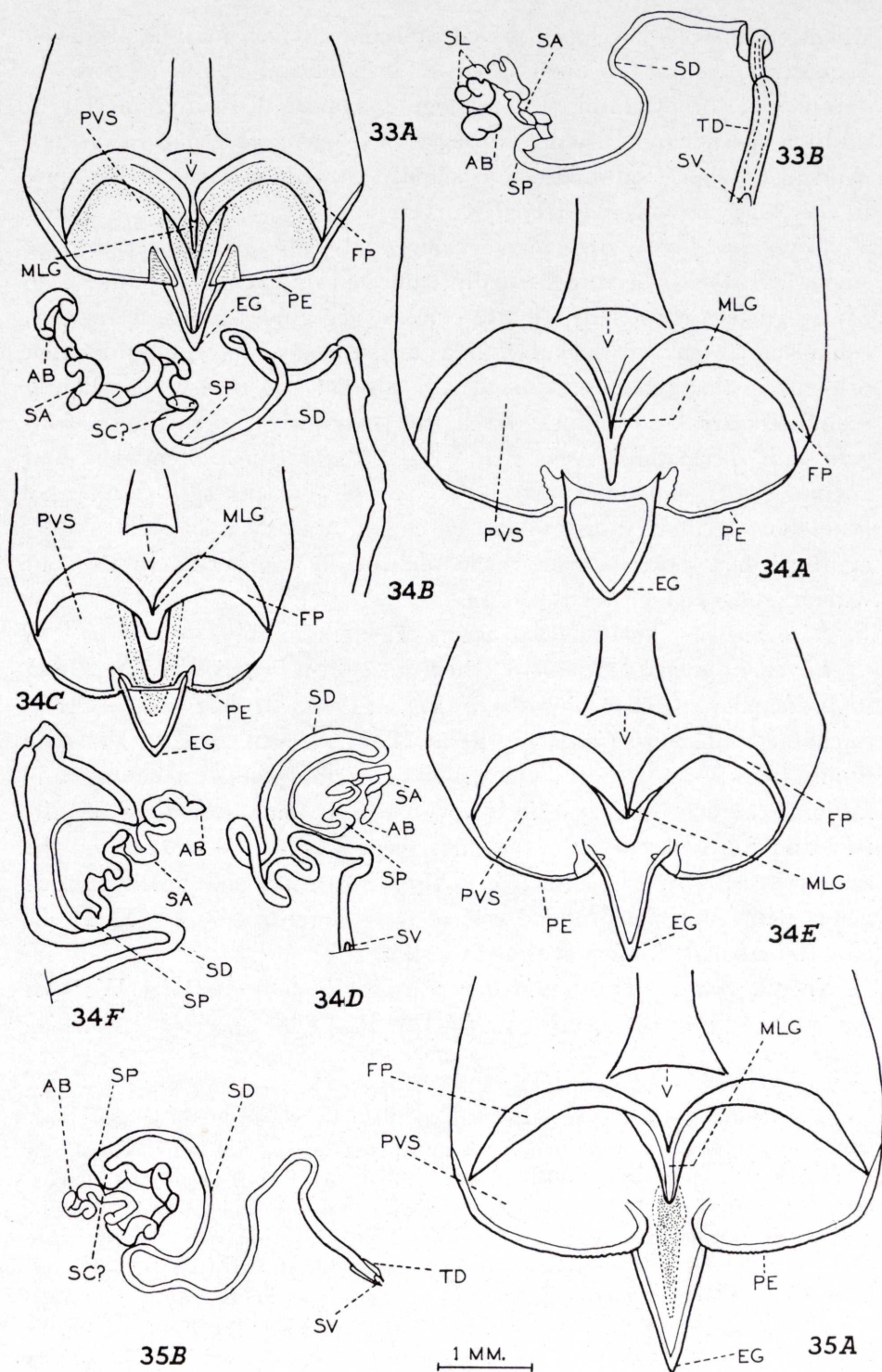


Fig. 32.—*Monistriini*: *Yeelanna pavonina* Rehn, phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.



Figs. 33-35.—*Monistriini*, female structures: 33) *Cygniterra maculicornis* (Sjöstedt); 34) A-B, *Monistria (M.) pustulifera pustulifera* (Walker) (*s. str.*); 34) C-D, *M. (M.) concinna concinna* (Walker); 34) E-F, *M. (M.) discrepans discrepans* (Walker, 1871) (*s. str.*) [= *ligata* Bolivar]; 35) *Yeelamma pavonina* Rehn. A, C, E, subgenital plate, dorsal; B, D, E, receptaculum seminis. For notation, see pp. 223-225.

usually with well developed dorsal inflections which may be produced backwards, ventral processes absent or insignificant, spermatophore sac subspherical or pyriform, seldom large, gonopore distinctly anterior in position, pseudoarch usually strongly developed, aedeagal valves not denticulate, short, subconical and slightly curved upwards at the apex to very long, narrow and strongly curved.

Concealed female structures: Subgenital plate with posterior edge smooth to weakly serrated, usually truncated or excised on either side of egg-guide, occasionally slightly convex, egg-guide strong, triangular, columellae absent but thickened areas at the base of the egg-guide often present, distinct contact areas usually absent, but transverse, slightly sculptured areas sometimes developed posteriorly; spermatheca elongate with spermathecal vesicle and caecum scarcely differentiated, and a convoluted, sometimes very long, subapical appendage (which may bear short secondary diverticula) ending in a small apical bulb; spermathecal duct short elongate, thick tube usually comparatively long but without a marked terminal dilation.

Distribution: Australia (including Tasmania) only.

Included genera: *Scutillya* Sjöstedt, 1921; *Petasida* White, 1845 (only female known); *Cygniterra* Rehn, 1953; *Monistria* Stål, 1873 (including subgenus *Greyacris* Rehn, 1953 — stat. nov.); *Yeelanna* Rehn, 1953 — stat. nov. On the basis of the phallic structures and fastigial characters, *Greyacris* is very close to some species of *Monistria*, and full generic status does not seem merited. *Yeelanna*, on the same criteria, is more distinctive. Also known is a new brachypterous genus with a median pronotal carina, to be described by Dr. K. H. L. Key (only female known at time of writing).

*Species examined*⁵: *Scutillya verrucosa* Sjöstedt, 1921 (S. Western Australia — Figs. 25, 26, Pl. II, figs. A, B) [Type species]⁶; *Petasida*

⁵ I am greatly indebted to Dr. K. H. L. Key, Canberra, for assistance with the nomenclature, which was somewhat confused by Rehn (1953) in many instances. Key (1969) has clarified the situation, but he has not yet discussed the subgeneric and subspecific status of the various taxa. The nomenclature adopted here is a compromise between Key's provisional 'lumping' and the recognition of certain zoogeographical entities as subspecies, pending his further studies — D. K. K.

⁶ This species was known to Tepper long before it was described. He applied the appellation *Trigonizella hesperia* to a specimen in the South Australian Museum, Adelaide, but never published the name. The male lectotype of the species, designated by proxy Rehn (1953) is from Swan R. and is in the British Museum (Natural History), London (see Key, 1969). A female paralectotype

ephippigera White, 1845 (Northern Territory — Fig. 27; Pl. II, figs. C, D) [Type species]⁷; *Cygniterra maculicornis* (Sjöstedt, 1921) (SW. Western Australia — Figs. 29, 33; Pl. II, figs. E, F) [Type species]; *Monistria* (*Monistria*) *discrepans discrepans* (Walker, 1871) [*nec* Rehn (1953); = *M. ligata* Bolívar, 1904] (E. New South Wales — Fig. 34, E, F, Pl. III, figs. C-F; Pl. VIII, figs. J, K); *M. (M.) discrepans* group, n. subsp. or n. sp. [referred to by Akbar and Kevan (1964) as *M. (M.) latevittata* Sjöstedt] (SW. Western Australia); *M. (M.) concinna concinna* (Walker, 1871) (C. Victorian and SE. New South Wales lowlands — Fig. 34, C, D, Pl. IV, figs. A, B); *M. (M.) concinna vinosa* Carl, 1966 [= *vinosa vinosa* of Rehn (1953)] (NW. Victorian, SE. New South Wales and Australian Capital Territory uplands below about 6000 ft. Fig. 30, Pl. IV, figs. C-J); *M. (M.) pustulifera pustulifera* (Walker, 1871), s. str. (Western Australia — Fig. 34, A, B, Pl. V, figs. G, H); *M. (M.) pustulifera*, n. subsp. [typical subspecies of Rehn (1953), *nec* Walker] (NW. Queensland, NE. Northern Territory); *M. (Greyacris) variola* (Rehn, 1953) (NW. Western Australia — Figs. 28, 31)⁸ [Type species of subgenus]; *Yeelanna pavonina* Rehn, 1953

(same locality as lectotype) is also in the British Museum, and another male in Stockholm. In spite of a contrary listing by Sjöstedt (1932), there is no female in the latter museum. Further specimens seen are a female collected many years ago by Spry, labelled merely "Australia" and others from Western Australia: Belladonia; Coolgardie; 70 ml. W. of Coolgardie; Cunderin; Glen Forrest; Karonia and Murdiman district (mostly in South Australian Museum, Adelaide) — D. K. K.

⁷ The only known specimens are discussed by Rehn (1953), who had not seen them, and some of his statements regarding the localities involved require correction (Key, 1969). I have examined the British Museum series of these specimens, discussed in detail by Key (*l. c.*), as follows: ♀ holotype (Pl. I, figs. C, D), "N. Holl. N. Coast"; 1 ♀ labelled "Found by the overland expedition from Moreton Bay to Port Essington under Leichard"; and 1 ♀ nymph labelled "Victoria R., N. Australia". I have also examined the material in the Geneva Museum referred to by Bolívar (1904) and Rehn (1953): a single ♀ labelled (1) N. Holl., ♀ S[au]ss[ure] (2) *Petasida ephippigera* White comp. Bolívar: Notas s. los Pirgomórfidos 1904. No other specimen is known.—D.K.K.

⁸ In addition to published records, this species is also known to the senior author from several localities in W. Western Australia: 36 miles N. E. and 15 miles E. N. E. of Cardawan; Carnarvon and 40 miles E. of same; 44 miles W. S. W. of Carnegie; Garden Well, 4 miles E. N. E. of Laverton; 10 miles E. N. E. of Laverton; homestead S. S. W. of Mundawindi; 13 and 14 miles S. W. of Mundawindi; 21 miles E. of Whin Creek (mostly in Australian National Collection, Canberra).

(E. Victoria — Victorian Alps, Buffalo R. and Baw-Baw — Fig. 32, 35).

Other species and subspecies: Cygniterra cicatricosa (Rehn, 1953) [comb. nov.—transferred from *Monistria* in agreement with the opinion of Dr. K. H. L. Key] (SW. South Australia, S. Western Australia); *Cygniterra*, n. sp. 1 (SW. & W. Western Australia); *Cygniterra*, n. sp. 2 (SE. & C. Western Australia); *Monistria* (*M.*) *latevitata* Sjöstedt, 1921 [*nec* Rehn (1953); this species has a macropterous form] (SW. Western Australia — Pl. III, figs. A, B); *M.* (*M.*) *discrepans bolivari* Brancsik, 1895 [= *ecarinata* Sjöstedt, 1921] (drier parts of S. Western Australia to New South Wales and S. Queensland — Pl. III, figs. G, H); this is known also in macropterous and brachypterous forms; *M.* (*M.*) *limitanea* Rehn, 1953 (N. New South Wales and W. Queensland) should probably be regarded as a synonym, intermediate between this subspecies and the next]; *M.* (*M.*) *d. incomitata* Rehn, 1953 (NE. New South Wales, SE. Queensland); *M.* (*M.*) *d. conspersa* Stål, 1875 ['typical' *discrepans* of Rehn (1953)] (moister parts of S. South Australia, including Kangaroo I. — Pl. III, figs. I, J); *M.* (*M.*) *concinna zebrata* Rehn, 1953 [full species of Rehn (1953) = *M.* (*M.*) *umbratilis* Rehn, 1953] (NE. New South Wales tableland); *M.* (*M.*) *concinna*, n. subsp. (barren grounds, S. New South Wales coastal regions); *M.* (*M.*) *c. excelsa* Rehn, 1953 [= *vinosa excelsa* of Rehn, 1953] (SE. New South Wales highlands above 6000 ft.); *M.* (*M.*) *lacrimans* Sjöstedt, 1921 [= *vinosa lacrimans* of Rehn (1953) and regarded as being synonymous with the next by Key (1969)] (E. Victorian lowlands — Pl. V, figs. A-D); *M.* (*M.*) *c. flavogranulata* Sjöstedt, 1921 [= *flavogranulata flavogranulata* of Rehn (1953)] (lowland Tasmania — Pl. V, figs. E, F); *M.* (*M.*) *c. truganinae* Rehn, 1953 [= *flavogranulata truganinae* of Rehn (1953)] (upland Tasmania); *M.* (*M.*) *pustulifera pustulosa* Stål, 1873 (E. Queensland — Pl. V, figs. I, J, Pl. IX, figs. H, I — known also to have a macropterous form) [Type species — as *M. pustulosa*]; *M.* (*M.*) *p. dedita* Rehn, 1953 (E. New South Wales); *M.* (*M.*) *p. malee* Rehn, 1953 [dubiously distinct from last] (W. New South Wales, Victoria, E. South Australia); *M.* (*M.*) *p. maculata* (Tepper, 1896) [= *M. sulcata auctt., nec* Tepper] (N. South Australia, Northern Territory, N. Western Australia — Pl. VI, figs. A-H); *M.* (*M.*) *profundesulcata* Carl, 1916 [= *M. roseipennis* Sjöstedt, 1920 = *M. cordata* Sjöstedt, 1921] (N. & NE. Queensland — Pl. VII, figs. A-F); *M.* (*M.*) *picta* Sjöstedt, 1921 (N. Northern Territory, N.

Western Australia — Pl. V, figs. I, J)⁹; *Yeelanna insulana* Rehn, 1953 [= *Monistria* (Y.) *mutabilis* Rehn, 1953, merely represents the macropterous form of this species] (S. South Australia, including Kangaroo I.) [Type species]; *Y. argus* Rehn, 1953 (SW. Victoria); *Yeelanna*, n. sp. [to be described by Dr. K. H. L. Key] (SE. New South Wales, Mt. Gungartan); New genus, new species [to be described by Dr. K. H. L. Key — see above] (N. Northern Territory, Katherine area).

Prior to the work of Kevan and Akbar (1964), the genera constituting this tribe were placed in the *Poecilocerini*, to the type genus of which the alate forms in particular bear a strong superficial resemblance. *Poecilocerus*, the only genus now remaining in the *Poecilocerini*, may be separated from *Monistriini* by the somewhat rounded (not greatly produced or subtruncate) posterior margin of the pronotal disc and the sinuous costal margins of the tegmina. The concealed copulatory structures also differ considerably: the epiphallus usually has median processes on the posterior and sometimes the anterior margin of the bridge (not perhaps a very significant character, but one not present in *Monistriini*), appendices usually rather closely applied to the lateral plates (divergent in *Monistriini*), lophi anterodorsally (not laterally) directed, rather narrow (not broad) valves of the cingulum, and an S-shaped spermatheca with an apical pocket and a short, distinct, simple caecum (quite unlike *Monistriini*).

The reasons for associating this tribe with the *Desmopterini* have already been given. The concealed copulatory structures also show some affinity with the *Chlorizeinini* (which at one time were also included in the *Poecilocerini*), a tribe with a disjunct distribution which may provide an ancestral link between *Monistriini* and *Poecilocerini*. The only recent comprehensive work on members of the *Monistriini* is that of Rehn (1953), which, however, is in need of revision. Key (1969) has now begun this by publishing the results of his detailed study of type material and has indicated nomenclature changes, but, for the present, not his conclusions regarding subgeneric and subspecific status.

The first published information on the concealed copulatory structures is that of Dirsh (1956), who figures the epiphallus of *Scutillya*

⁹ Dr. K. H. L. Key informs me that this is the only monistriine known to secrete a defensive fluid (observation of Dr. Callaby) — D. K. K.

verrucosa and *Monistria pustulifera* (? subspecies *pustulifera*). Akbar and Kevan (1964) illustrate the phallic structures of *Cygniterra maculicornis* and *Monistria* (*M.*) *concinna vinosa* [as *vinosa excelsa*]. They refer also to *M.* (*M.*) *discrepans*, n. subsp. [as *M.* (*M.*) *latevitata*] and *Yeelanna pavonina*. Their figures are repeated in modified form here. The female structures have not previously been discussed.

SERIES VI.

This is a very heterogeneous assemblage of African, Malagasy, Sokotran and southern continental Asiatic genera; not found in the islands of SE. Asia, or in Australasia or the Americas. Although certain genera are easily recognized, the external morphological features that unite the tribe are largely negative, as follows: body form rarely subcylindrical, not strongly fusiform, neither depressed nor compressed, sometimes, but by no means always, large and robust; antennae not inserted very far in front of the lateral ocelli, cylindrical, not distinctly triquetrous or flattened basally; head never strongly conical nor frontal, profile very oblique, fastigium of vertex short or of moderate length, never acutely pointed or longer than its basal width; tegmina and hind wings never absent, but often rather short, sometimes greatly reduced, if latter, tegmina are lobe-like, never tongue- or strap-like, hind wings, when fully developed, not strongly tapered or pointed, often brightly coloured (not in smaller species), sometimes tessellated; pronotum sometimes adorned with prominent wart-like or tooth-like tubercles (some *Phymateini*), lateral carinae of disc obsolescent or absent, inferior margin of lateral lobe never very straight or beset with fine, regular granules; interspace between mesosternal lobes not widening posteriorly; hind femur occasionally uniquely maculate on the inner face (*Phymateini-Zonocerina*), infero-external face not expanded and displaced upwards. The majority of the foregoing general characterizations would also cover most *Monistriini* (Section V), but that tribe has already been defined and in any event it is excluded on zoogeographical grounds as it is confined to Australia.

The phallic structures of the included tribes have the following characters in common: epiphallus usually of conventional form, almost always with rather large, divergent, lobe-like anterior projections;

ectophallus usually pear-shaped and with a moderately deep, semicircular basal emargination, zygoma usually large and broad, convex or produced anteriorly (suprazygomal plate very variable in form), valves of cingulum distinct, of small to moderate size, rounded or elongate in dorsal view, apodemal plates very often with ventral processes; endophallus somewhat variable but never very elongate or highly specialized, aedeagal sclerites rather straight or only a little curved, never divided apically, spermatophore sac large, usually oval or pear-shaped, occasionally subspherical, some forms (subtribe *Chlorizeinina*) with an unique secondary dorsal sac on the phallotreme duct, gonopore near, or sometimes somewhat in advance of the middle.

In the concealed female structures, the posterior edge of the subgenital plate is serrated, at least near the egg-guide, and is commonly transverse; the base of the egg-guide also commonly has sculptured columella-like areas on either side of it, and transverse, submarginal contact areas are often present; the spermathecal vesicle is usually clearly indicated by the presence of a distinct apical pocket marking it off from the typically U-shaped caecum. A spermathecal appendage, more or less confluent with the end of the caecum and typically with a small apical bulb, is usually present. This varies in form from an elongate, rather thick, convoluted tube to a mere undifferentiated extension of the caecum; it may be greatly reduced or lacking.

Three tribes are included in this series: *Chlorizeinini*, *Poekilocerini* and *Phymateini*. Whether the anomalous Sokotran genus *Physemophorus* Krauss (here placed in the subtribe *Zonocerina* of the *Phymateini*) should be regarded as constituting an independent tribe is a moot point. In external morphology, it seems reasonably close to *Zonocerus* Stål, to which its concealed copulatory structures bear some resemblance, but the latter have some features suggesting relationship with certain African *Chlorizeinini*, and its female subgenital plate provides a link with *Poekilocerini*. It probably diverged in isolation from the common ancestral stock of the series, retaining certain features in common with one tribe or another and becoming peculiarly specialized in others. To avoid the recognition of several monogeneric taxa, *Physemophorus* is best left for the present where it is.

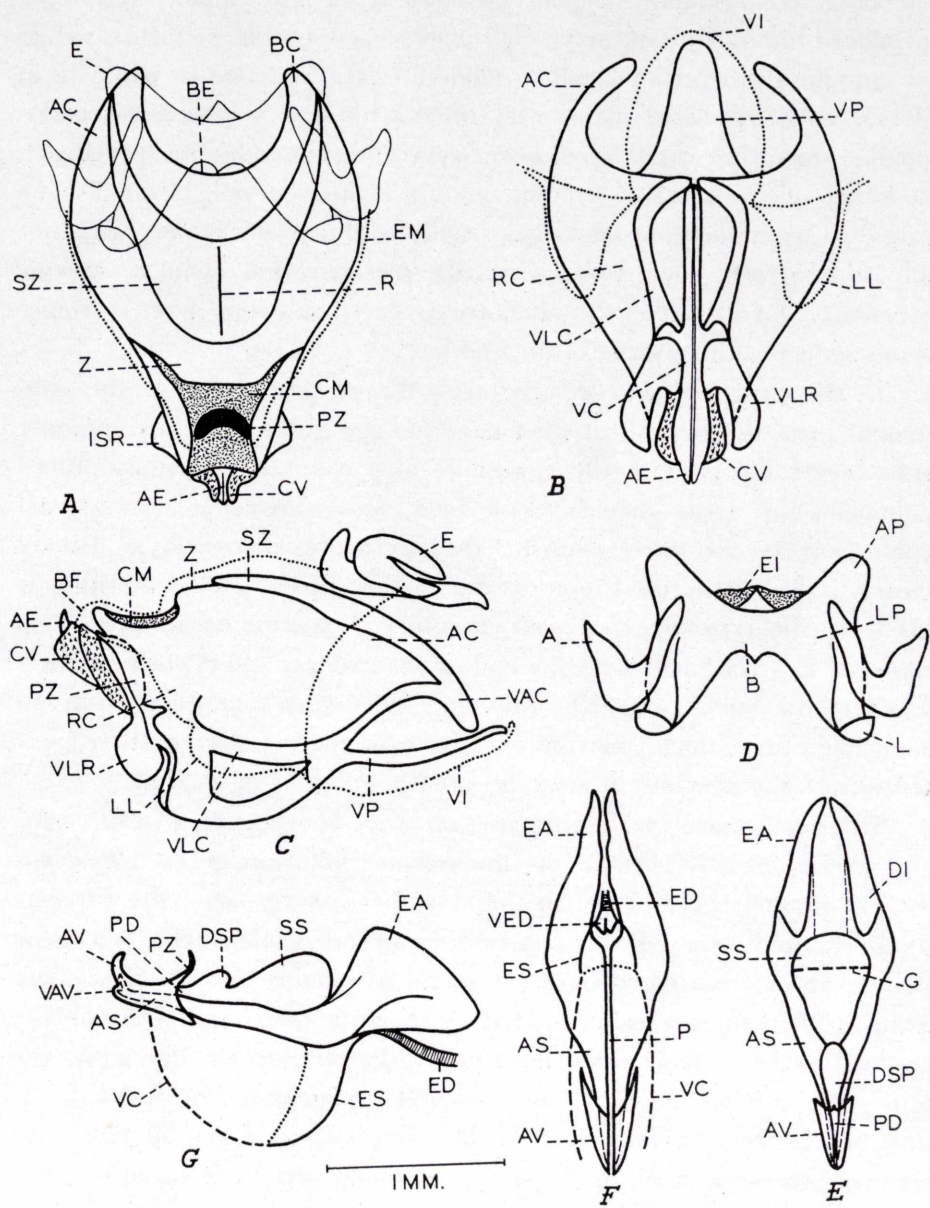


Fig. 36.—*Chlorizeinini* (*Chlorizeinina*): *Pterorthacris subcallosa* Uvarov, phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

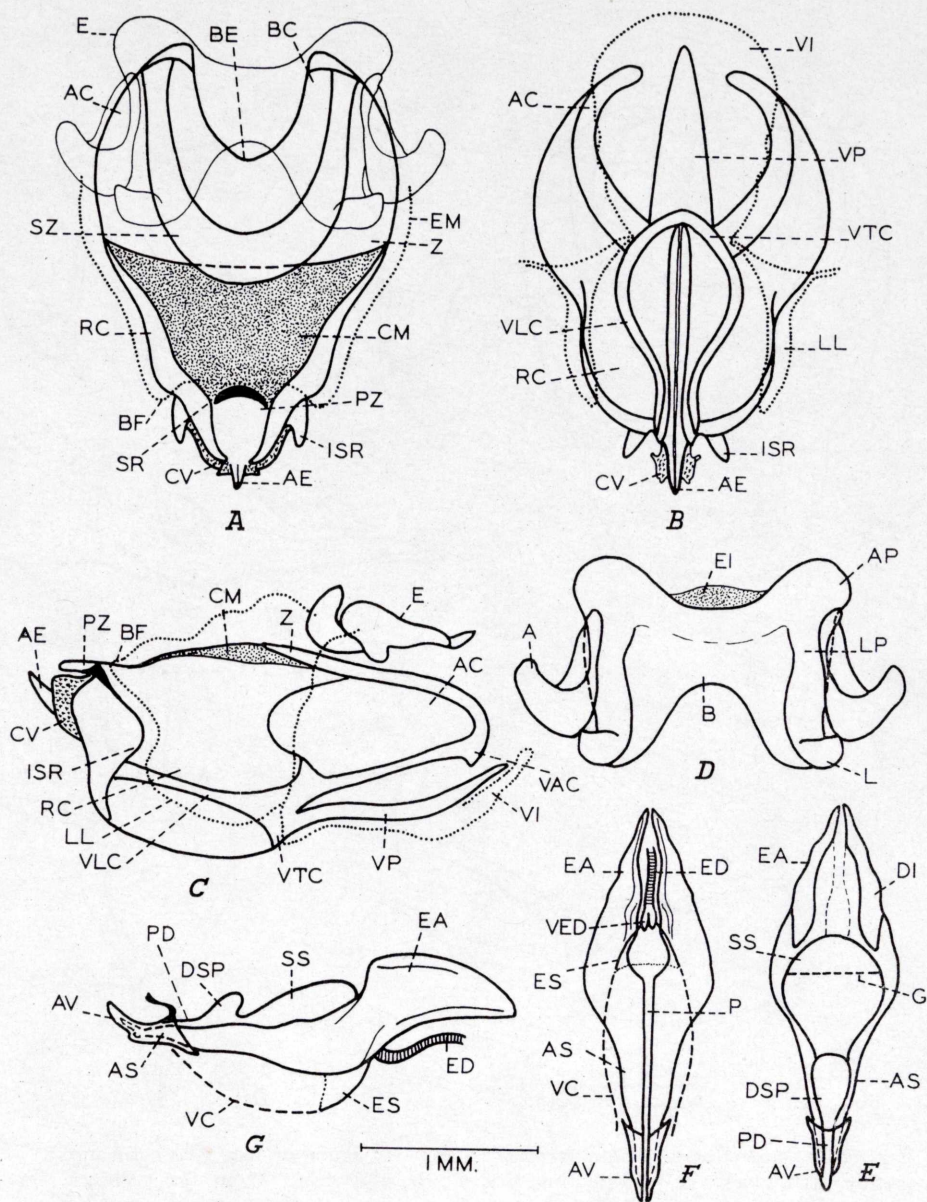


Fig. 37.—*Chlorizeinini* (*Chlorizeinina*): *Chlorizeina unicolor unicolor* Brunner von Wattenwyl (*s. str.*), phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

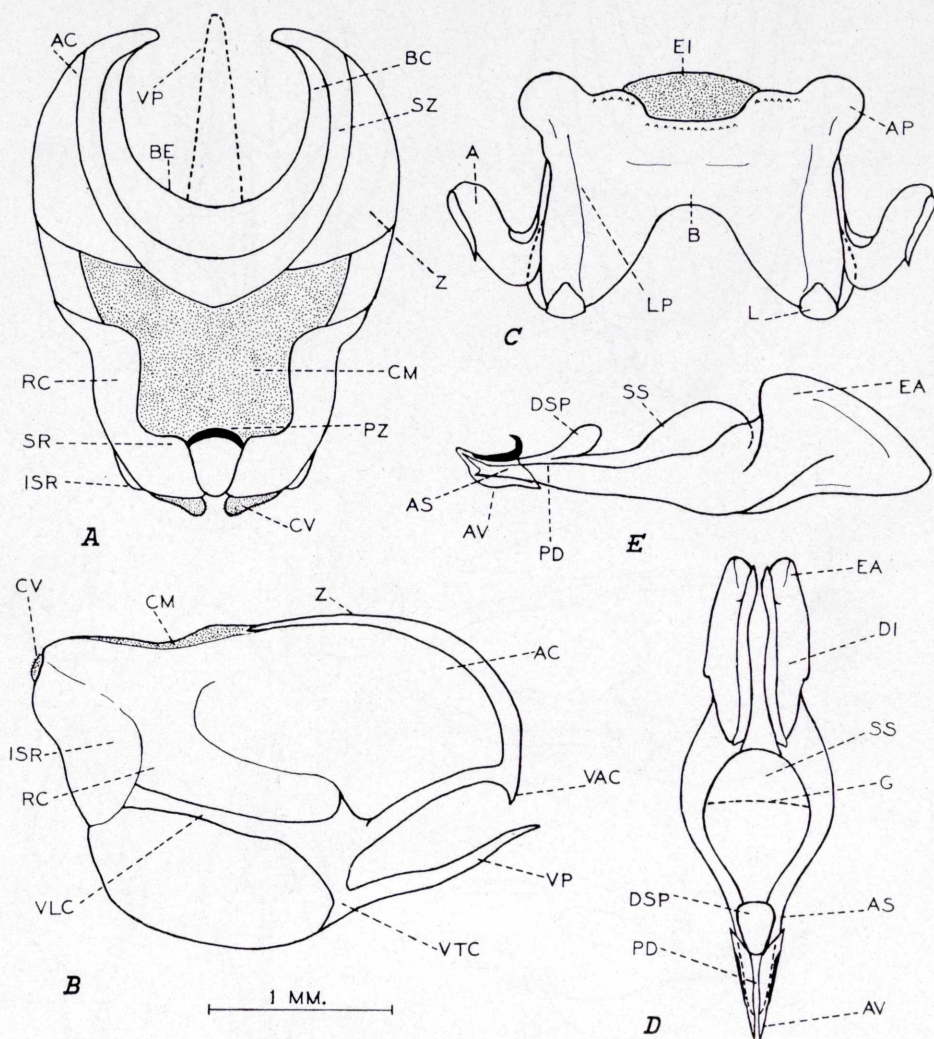
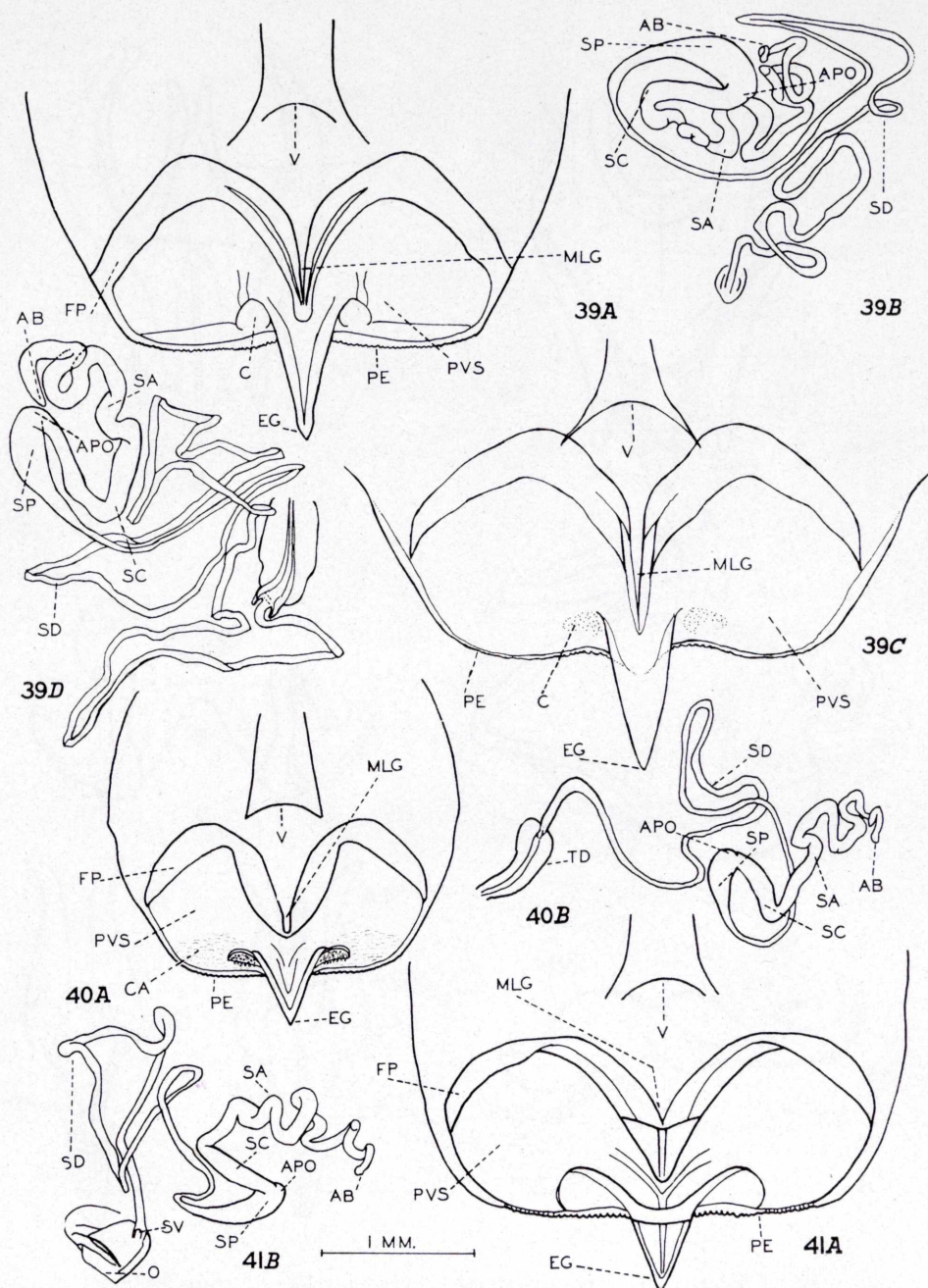


Fig. 38.—*Chlorizeinini* (*Chlorizeinina*): *Feacris malabarensis* (Kevan), holotype, phallic structures: *A*, ectophallus, dorsal; *B*, the same, from the right; *C*, epiphallus, dorsal; *D*, endophallus, dorsal; *E*, the same, from the right, for notation, see pp. 223-225.



Figs. 39-41.—*Chlorizeinini* (*Chlorizeinina* and *Humpatellina*), female structures: 39) A, B, *Chlorizeina unicolor unicolor* Brunner von Wattenwyl; 39) C, D, *Feacris malabarensis* (Kevan); 40) *Humpatella severini* Bolívar; 41) *Carvendia glabrata* Karsch. A, C, subgenital plate, dorsal; B, D, receptaculum seminis. For notation, see pp. 223-225.

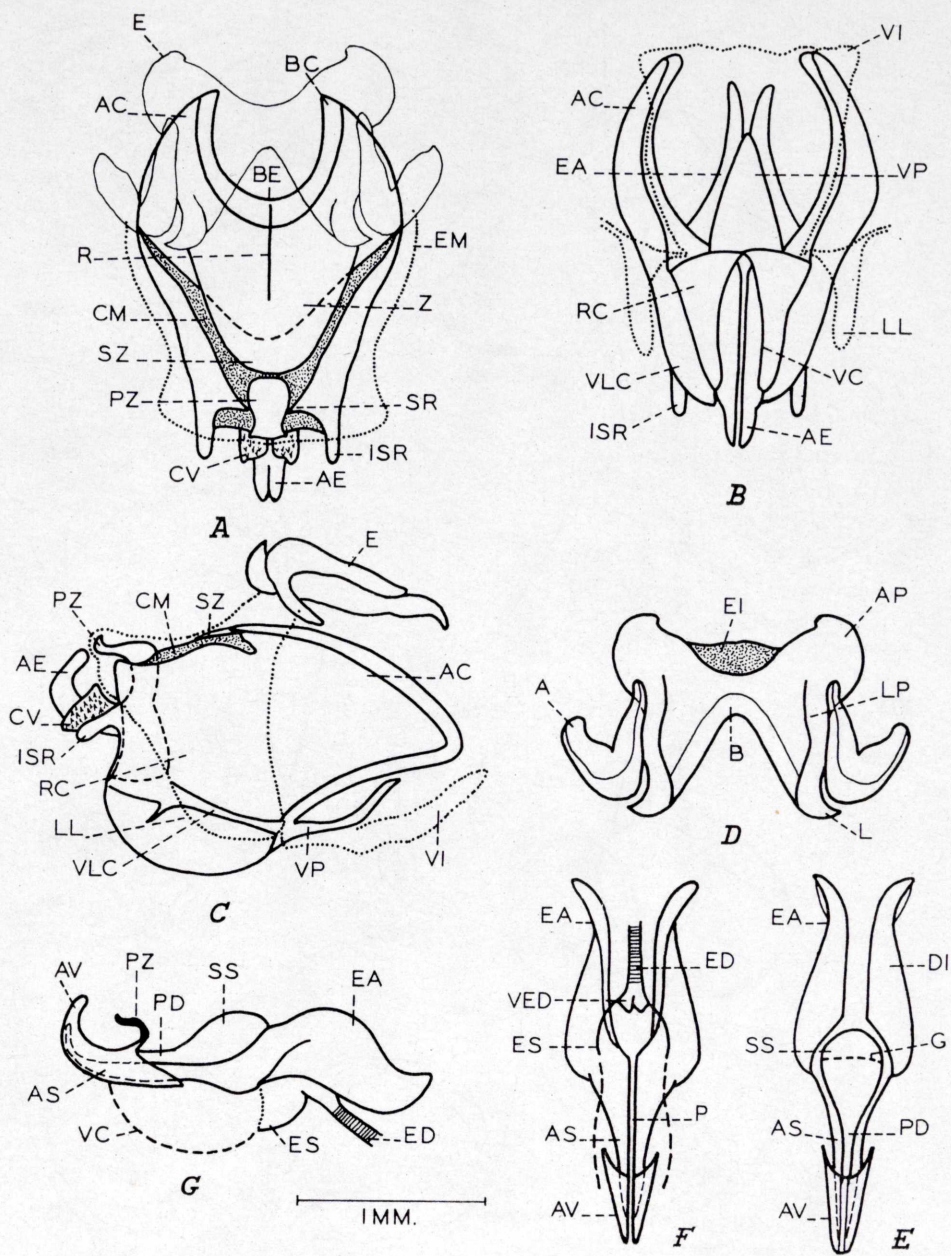


Fig. 42.—*Chlorizeinina* (*Humpatellina*): *Humpatella severini* Bolívar, phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

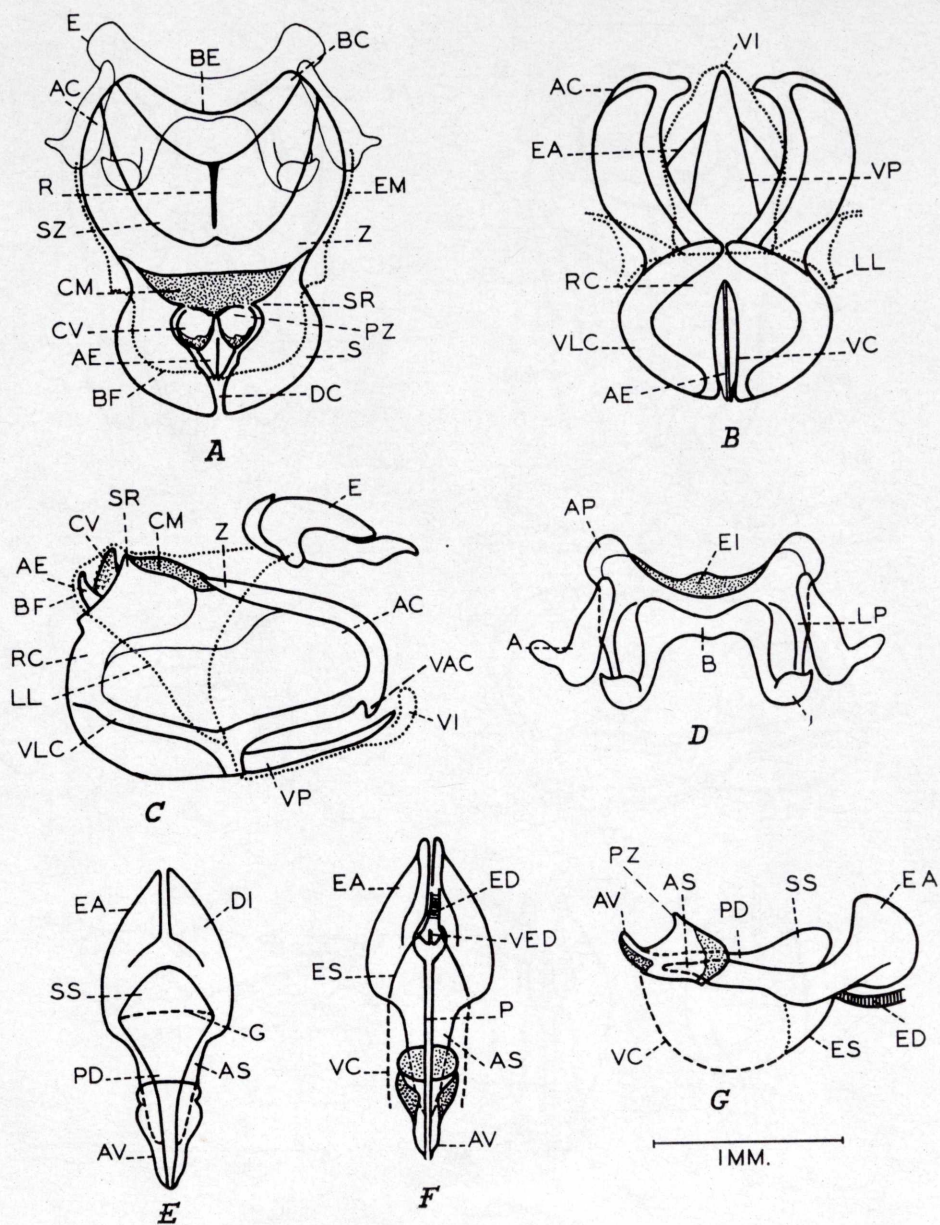


Fig. 43.—*Chlorizeinini* (*Humpatellina*): *Cavendia glabrata* Karsch, phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

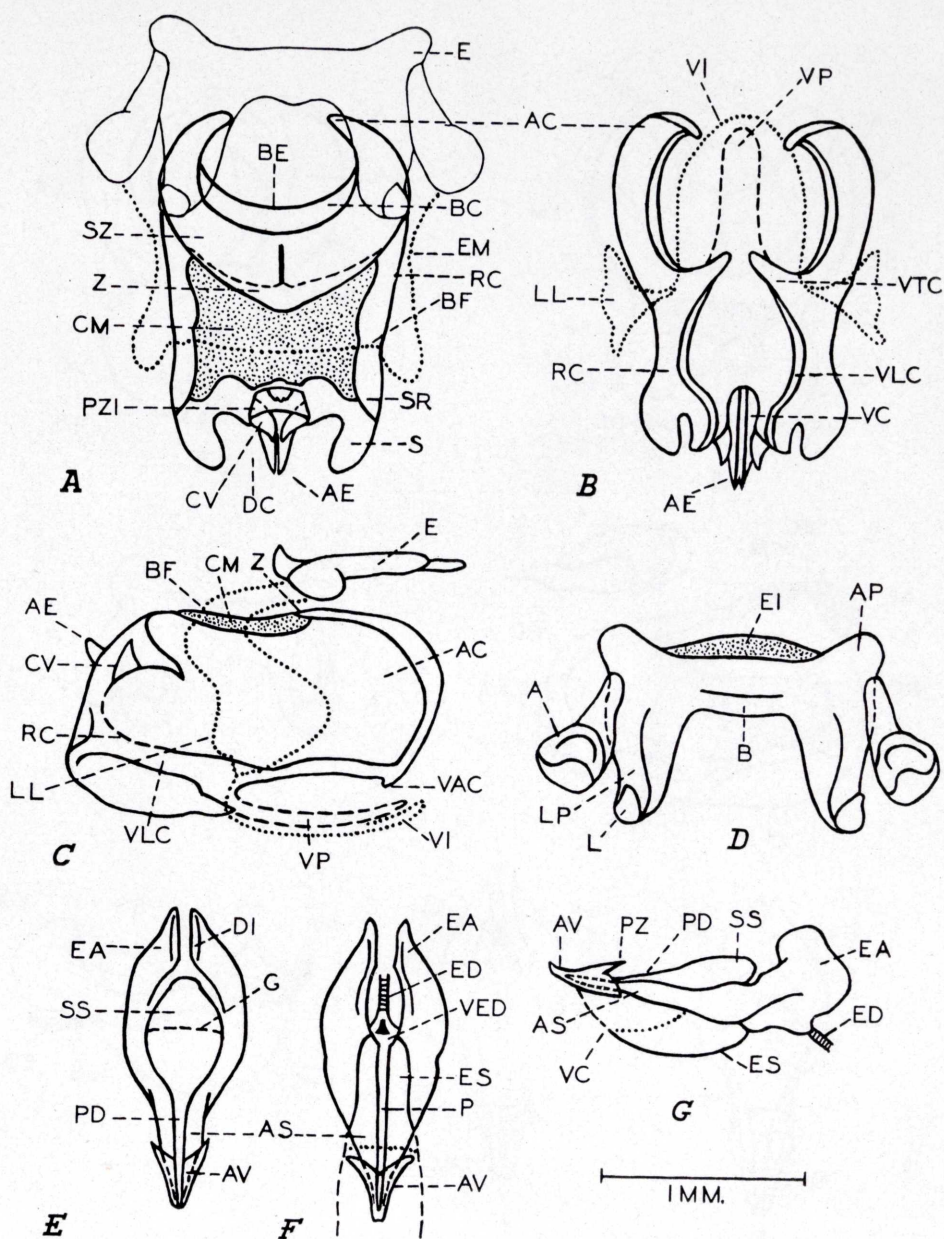


Fig. 44.—*Chloriscinini* (*Humpatellina*): *Pseudorubellia brancsiki* (Bolívar), phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

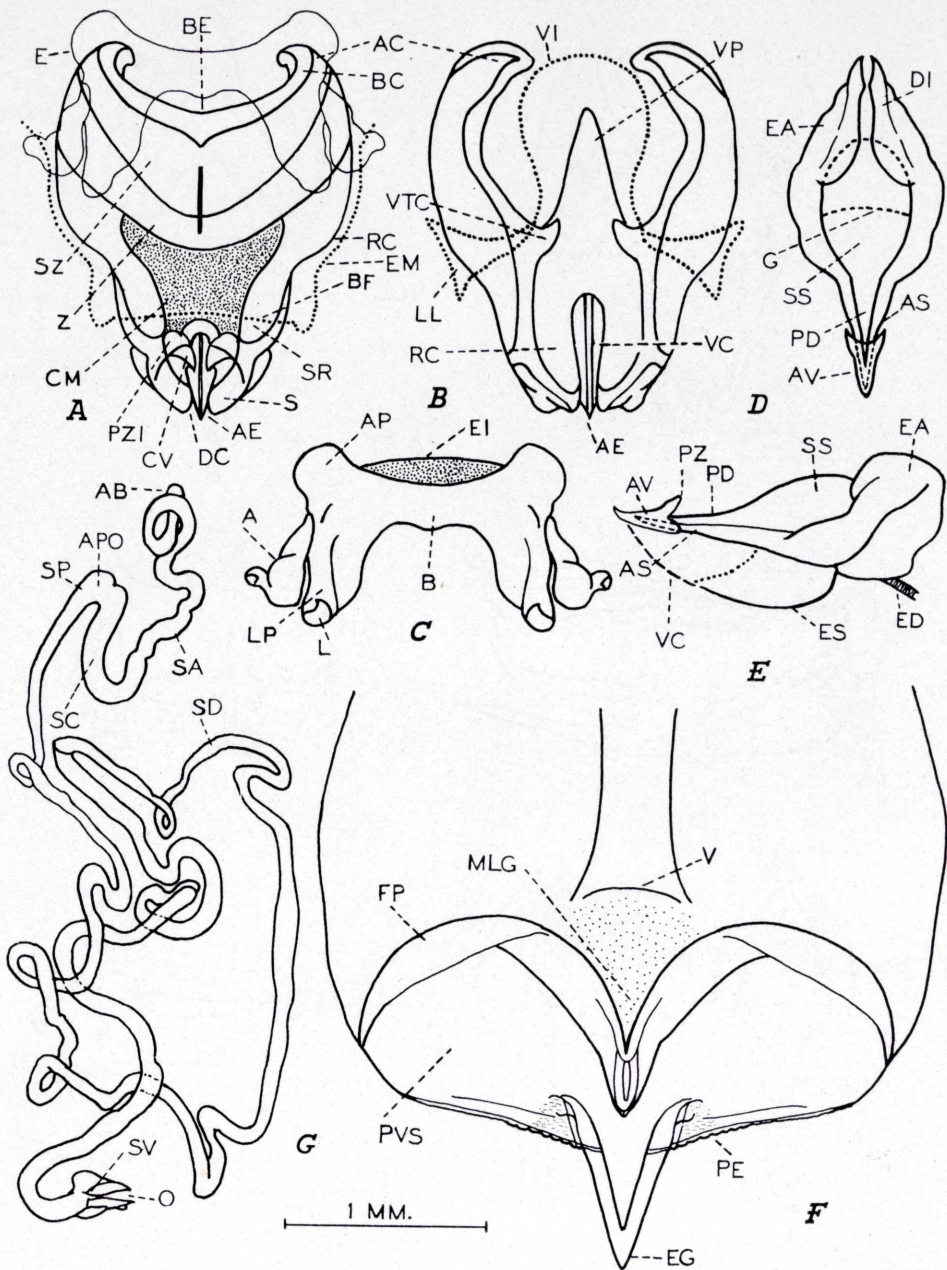


Fig. 45.—*Chlorizeinini* (*Humpatellina*): *Pseudorubellia thoracica thoracica* Dirsh; A-E, phallic structures (A, ectophallus dorsal; B, the same, ventral; C, epiphallus, dorsal; D, endophallus, dorsal; E, the same, from the right); F-G, female structures (F, subgenital plate, dorsal; G, receptaculum seminis). For notation, see pp. 223-225.

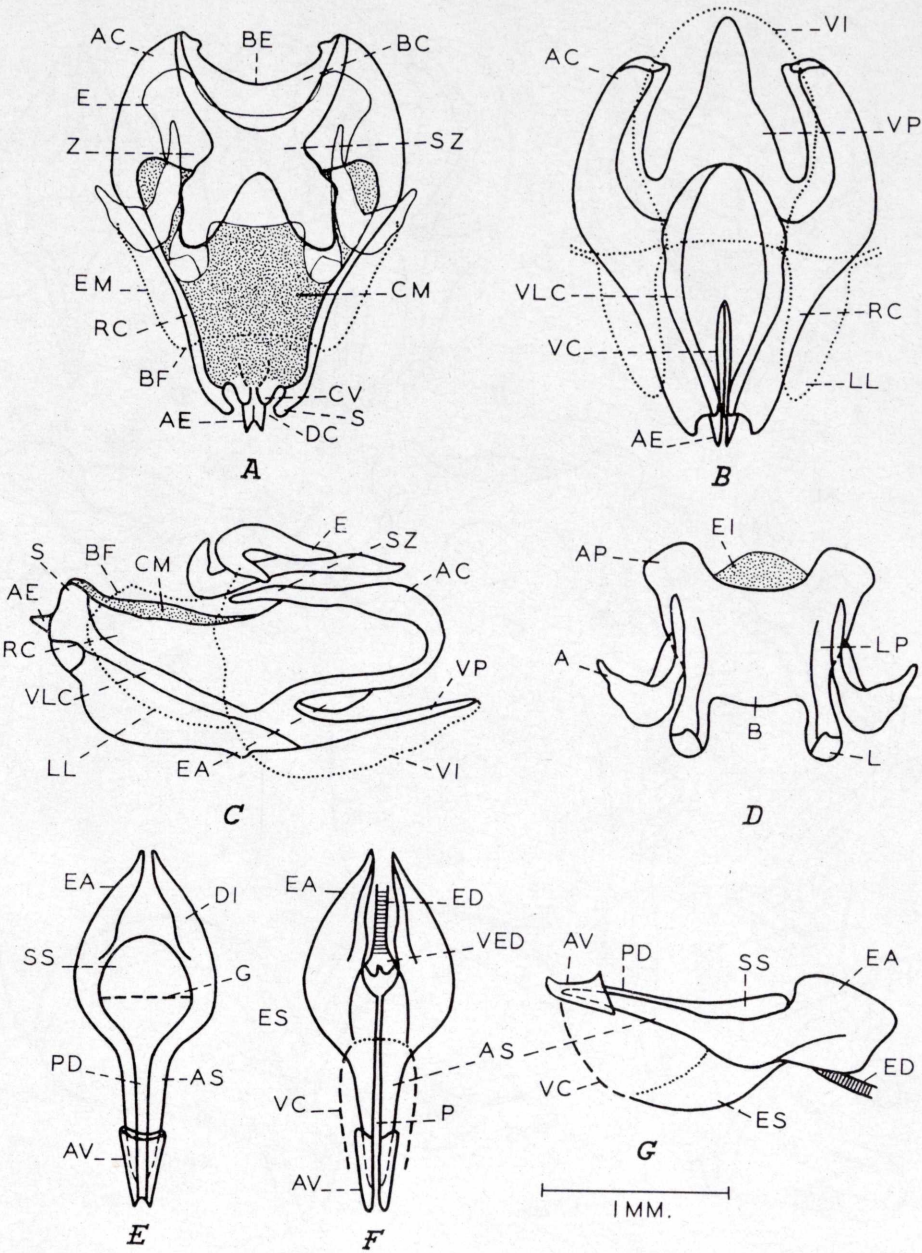


Fig. 46.—*Chlorizeinini* (*Marsabitacridina*): *Marsabitacris citronota* Kevan, holotype, phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

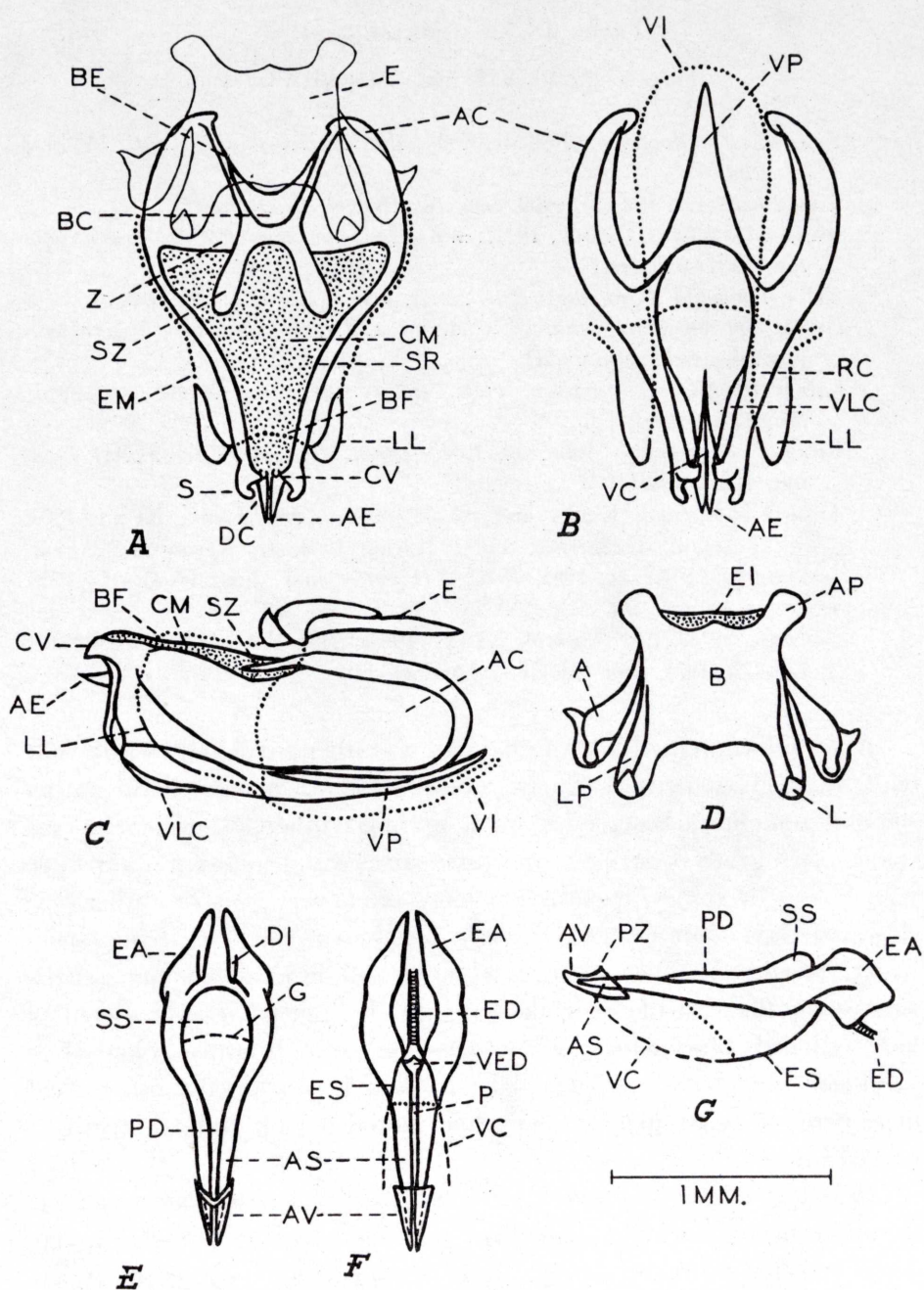


Fig. 47.—*Chlorizeinini* (Marsabitacridina): *Katangacris enigmatica* Kevan, holotype, phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

TRIBE 18. CHLORIZEININI.

(Figs. 36-47; Pl. VII, figs. G-L; Pl. VIII).

Subfam. *Poecilocerinae* Bolívar, 1904, *Bol. Soc. esp. Hist. nat.*, IV, 432 (*partim*).

Sect. *Poeciloceri* Bolívar, 1909, *Gen. Ins.*, XC, 4, 20 (*partim*).

Section *Orthacres* Uvarov, 1921, *Ann. Mag. nat. Hist.* (9), VII, 494 (*partim*) [*Pterorthacris*].

Tribe *Tagastini* Rehn, 1951, *Ent. News*, LVII, 242, 243, 244 (*partim*).

Group *Sphenarii* Johnston, 1956, *Annot. Cat. Afr. Grassh.*, 121 (*partim*) [*Pseudorubellia brancsiki*].

Group *Poeciloceri* Johnston, 1956, *Annot. Cat. Afr. Grassh.*, 162 (*partim*) [*Humpatella*].

Group *Pyrgomorphae* Johnston, 1956, *Annot. Cat. Afr. Grassh.*, 167 (*partim*) [*Cavendia*].

Tribe *Chlorizeinini* Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1507, fig. 1 (map), 1522, 1525, 1529; Kevan, 1964, *In* Kevan and Akbar, *Ibid.*, 1532; Kevan, 1965, *Proc. XII Int. Congr. Ent.*, 1964, 442; 1968, *Trans. Amer. ent. Soc.*, XCIV (1968), 355, 357; Kevan, Akbar and Chang, 1969, *Eos*, Madrid, XLIV (1968), 219; 1970, *Ibid.* XLV (1969), 175-177; 1971, *Ibid.* XLVI (1970), 124, 148.

External features: Body of moderate to rather small size, not heavily built although sometimes fairly robust; integument sometimes rather smooth, sometimes beset with small granular tubercles, coloration variable, often green or striped, sometimes maculate; pronotum never beset with bosses or spines, mesosternal lobes often very (♂) or rather (♀) close together, their interspace narrower than a lobe, or, if interspace wider, prosternal tubercle low; tegmina and hind wings not usually surpassing the end of the abdomen, usually somewhat abbreviated or very reduced, hind wings, when developed, not brightly coloured or speckled; hind femora, if maculate, without a spot on the inner face; male cerci in most genera somewhat specialized or at least distinctly curved inwards.

Principal phallic characters: Epiphallus with lateral plates broad at the base, bridge variable, sometimes constricted in the middle or very deep, anterior processes always well developed and divergent, appendices typically divergent, greatly enlarged apically; ectophallus pear-shaped to subrectangular, central membrane very variable in extent, zygoma varying within the full range for the Series, suprazygomal plate usually broadly tongue-like, but sometimes semicircular, or narrow

and deeply excavated posteriorly and laterally so as to form an unique H-, X-shaped structure, basal emargination usually fairly deep, semi-circular, sometimes shallower, basal thickening generally rather heavy, apodemal plates in lateral view usually either pointed apically or with ventral processes, suprarami often with inflections, valves of cingulum usually well developed, sometimes denticulate, ventral process of cingulum narrow or acutely triangular, usually extending forward at least as far as the apodemal plates, ventral longitudinal thickenings generally rather heavy and often strongly curved; aedeagal sclerites rather straight or slightly curved upwards apically, endophallic apodemes, with or without extensive dorsal inflections, often produced forwards ventrally or with small ventral processes, spermatophore sac ovoid or pyriform (if latter, sometimes with an unique secondary dorsal diverticulum on phallotreme duct), pseudoarch variably developed but not usually prominent, aedeagal valves short, conical or upwardly curved apically, sometimes with a ventral pocket receiving the apices of the aedeagal sclerites.

Concealed female structures: Subgenital plate with posterior edge serrated, egg-guide prominent, triangular, often with columella-like thickenings at the base and sometimes with transverse contact areas adjacent to the posterior edge; spermathecal vesicle with a rather indistinct apical pocket, appendage rather long and convoluted, usually with an apical bulb; spermathecal duct moderately long, thick tube not well differentiated, terminal dilation lacking or small. [♀ not known in one subtribe].

Distribution: South-east continental Asia, northern and western Madagascar, tropical Africa.

This tribe, apart from its affinities with other members of Series VI, is probably distantly related to the *Orthacridini* (Group 'A', Series IV) to which some of its members bear a superficial resemblance; in fact the copulatory structures, particularly those of the female in *Burmorthacris* Kevan, Singh and Akbar, are quite reminiscent of *Chlorizeini*. The tribe, like the *Orthacridini*, is probably of ancient origin, as indicated by its widespread distribution, so that a common ancestry for the two tribes is quite feasible. There may also be some relationship with the *Tagastini* (Series VIII), but, if so, this is not close.

The *Chlorizeinini* may be divided into three subtribes, as follows:

Subtribe *a.* CHLORIZEININA.

(Figs. 36-39).

Subfam. *Poecilocerinae* Bolívar, 1904, *Bol. Soc. esp. Hist. nat.*, IV, 432 (*partim*).

Sect. *Poeciloceri* Bolívar, 1909, *Gen. Ins.*, XC, 4, 20 (*partim*).

Section *Orthacres* Uvarov, 1921, *Ann. Mag. nat. Hist.* (9), VII, 494 (*partim*) [*Pterorthacris*].

Tribe *Tagastini* Rehn, 1951, *Ent. News*, LVII, 242, 243, 244 (*partim*).

Subtribe *Chlorizeinina* Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1507, fig. 1 (map), 1522, 1525; Kevan, 1969, *Trans. Amer. ent. Soc.*, XCIV (1968), 355-357, 360, 361, 362 (last as *Chlorizeina* [*sic*]), 368.

External features: General coloration usually without dark stripes or blackish maculations; posterior margin of pronotal disc at least slightly convex even in brachypterous species; male cerci curved.

Principal phallic characters: Epiphallus with bridge constricted in the middle; ectophallus with suprazygomal plate broadly tongue-like, inflexions of suprarami present, valves of cingulum well developed, denticulate; endophallus with apodemes produced forwards ventrally, dorsal inflexions long, spermatophore sac pyriform, phallotreme duct with an unique dorsal secondary diverticulum, aedeagal valves upwardly curved apically with ventral pockets receiving the apices of the aedeagal sclerites.

Concealed female structures (where known): Egg-guide very long, columella-like structures at its base well defined, distinct contact areas not developed.

Distribution: Continental SE. Asia.

Included genera: *Pterorthacris* Uvarov, 1921 (only male known); *Feacris* Kevan, 1968; *Chlorizeina* Brunner von Wattenwyl, 1893.

Species examined: *Pterorthacris subcallosa* Uvarov, 1921 (NE. India — Fig. 36) [Type species]; *Feacris malabarensis* (Kevan, 1953) (SW. India — Figs. 38, 39 C, D) [Type species]; *F. reducta* Kevan, 1968 (SW. India); *Chlorizeina togulata* Rehn, 1951 [= *Ch. unicolor* Ramme, *nec* Brunner von Wattenwyl, 1893 (middle and Lower Burma); *Ch. unicolor unicolor* Brunner von Wattenwyl, 1893 [= *Ch. elegans* Ramme, 1941] (E. Assam, Upper Burma, Thailand except S. lowlands, to W. Laos — Figs. 37, 39 A, B) [Type species]; *Ch. unicolor roonwali* Bhowmik, 1964 (lowlands of Assam); *Ch. feae* Kevan, 1969 (S. Thailand lowlands).

Other species: none known.

Figures of the concealed copulatory structures are given by Kevan (1969) in a preliminary revision of the subtribe.

Subtribe b. HUMPATELLINA.

(Figs. 40-45; Pl. VII, figs. G-L; Pl. VIII, figs. A-H).

Subfam. *Poecilocerinae* Bolívar, 1904, *Bol. Soc. ent. Hist. nat.*, IV, 432 (*partim*).

Sect. *Poeciloceri* Bolívar, 1909, *Gen. Ins.*, XC, 4, 20 (*partim*).

Group *Sphenarii* Johnston, 1956, *Annot. Cat. Afr. Grassh.*, 121 (*partim*) [*Pseudorubellia brancsiki*].

Group *Poeciloceri* Johnston, 1956, *Annot. Cat. Afr. Grassh.*, 162 (*partim*) [*Humpatella*].

Group *Pyrgomorphae* Johnston, 1956, *Annot. Cat. Afr. Grassh.*, 167 (*partim*) [*Carwendia*].

Subtribe *Humpatellina* Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1507, fig. 1 (map), 1522, 1525; Kevan, 1969, *Trans. Amer. ent. Soc.*, XCIV (1968), 355; Kevan, Akbar and Chang, 1970. *Eos*, Madrid, XLV (1969), 176.

External features: General colour pattern incorporating longitudinal dark stripes, hind femora without conspicuous dark maculations; postules on pronotum rather indistinct, posterior margin of pronotal disc in strongly brachypterous species truncated; fully macropterous species not yet known; male cerci usually curved.

Principal phallic characters: Epiphallus with a narrow or constricted bridge; ectophallus with suprazygomal plate broadly tongue-like or very large and wide, inflections of suprarami present or not, valves of cingulum well developed, sometimes denticulate; endophallus with apodemes variable, sometimes produced forward ventrally or with small ventral processes, dorsal inflections long or not, spermatophore sac ovoid or pyriform, phallotreme duct and aedeagal valves simple, latter usually curved upwards apically.

Concealed female structures: Egg-guide triangular, columella-like structures at base not well defined, distinct contact areas near the posterior edge sometimes present.

Distribution: Tropical Africa, northern and western Madagascar.

Included genera: *Humpatella* Karsch, 1888; *Carwendia* Karsch, 1896; *Pseudorubellia* Dirsh, 1963.

Species examined: *Humpatella severini* Bolívar, 1904 (S. Zaire, Angola — Figs. 40, 42, Pl. VII, figs. I, J); *Carwendia glabrata* Karsch, 1868 (Central Africa — Figs. 41, 43) [Type species]; *Pseudorubellia brancsiki* (Bolívar, 1904) (N. Madagascar — Fig. 44, Pl. VIII, figs. A, B) [Type species]¹⁰; *P. thoracica thoracica* Dirsh, 1963 (NW. Madagascar — Fig. 45; Pl. VIII, figs. C, D).

Other species and subspecies: *Humpatella constricta* Karsch, 1888 (Angola — Pl. VII, figs. G, H) [Type species]; *H. huambae* Uvarov, 1953 (Angola — Pl. VII, figs. K, L); *Pseudorubellia thoracica geniculata* Dirsh and Descamps, 1968 (W. Madagascar — Pl. VIII, figs. E-H). It is quite possible that *Parasphena nigropicta* Bolívar, 1889, of which the unique holotype is lost is in fact a species of *Humpatella*, as the characters given in the original description and the type locality in SW. Angola are more in accord with those of that genus than with *Parasphena* (which is exclusively East African). The subnitid integument clothed with distinct grey hairs and the colour pattern (including separate dorsal maculae on the abdomen) are found in some forms of ♀ *Humpatella*. The low prosternal tubercle and external apical tibial spine are also characteristic of that genus. The species *nigropicta* clearly cannot be retained in *Parasphena*, so provisionally *P. nigropicta* = *Humpatella nigropicta* (Bolívar, 1889), comb. nov.

The relationship between this subtribe and the last is clearly indicated by *Humpatella* Karsch, in which the phallic structures are very similar to those of *Chlorizeina*, except for the special features of the base of the phallotreme duct and aedeagal valves.

There has been no recent revision of the members of this subtribe although the various genera have been examined by Kevan (1956, 1962) (*Carwendia*), Uvarov (1953) and Dirsh (1966) (*Humpatella*), and Dirsh and Descamps (1968) (*Pseudorubellia*). Dirsh (1956, 1965, 1966,

¹⁰ Dirsh (1963) gives the type locality of *P. brancsiki* as "Diego Suárez", but the type specimen (in Madrid) is labelled "Madagascar" only; Bolívar's original description mentions that he had seen other material from Diego Suárez, but he does not imply that he had more than the one specimen before him at the time. Any such material, therefore, cannot be regarded as syntypic; none has been traced. The male of which the phallic structures are here figured is from Mt. Ambre (SW. of Diego Suárez). Kevan and Akbar (1964) suggested that *P. thoracica*, based on an unique female, might be a synonym of *P. brancsiki*, representing the opposite sex, but further material (including males), now in the Paris Museum, indicates otherwise (Kevan, 1968) — D. K. K.

1970) figures the epiphallus of *Humpatella severini*; the same author (1963) illustrates the spermatheca of *Pseudorubellia thoracica*. The latter figure is repeated by Dirsh and Descamps (1968).

Subtribe *c.* MARSABITACRIDINA.

(Figs. 46, 47; Pl. VIII, figs. I-L).

Subtribe *Marsabitacridina* Kevan and Akbar, 1964; *Canad. Ent.*, XCVI, 1507, fig. 1 (map), 1522, 1525; Kevan, 1964, *In* Kevan and Akbar, *Ibid.*, 1532; Kevan, *Trans. Amer. ent. Soc.*, XCIV (1968), 355; Kevan, Akbar and Chang, 1969, *Eos*, Madrid, XLIV (1968), 169.

External features: General coloration with blackish maculations notably on the hind femora, or extensive black markings; posterior margin of pronotal disc truncate in forms without fully developed wings; pronotal pustules small but conspicuous; male cerci simple.

Principal phallic characters: Epiphallus with a very deep, quadrate bridge; ectophallus with a very extensive central membrane and a unique X- or H-shaped suprazygomal plate, inflections of supramami not developed, valves of cingulum small; endophallus with apodemes simple, dorsal inflections small, spermatophore sac ovoid, phallotreme duct and aedeagal valves simple, latter small, conical, almost straight.

Concealed female structures: Unknown.

Distribution: Katanga and N. Kenya.

Included genera: *Marsabitacris* Kevan, 1957 (only male known); *Katangacris* Kevan, 1964 (only male known).

Species examined: *Marsabitacris citronota* Kevan, 1957 (N. Kenya — Fig. 46, Pl. VIII, figs. I, J) [Type species].

Other species: None known.

This subtribe is somewhat anomalous, but the general external resemblance between *Marsabitacris* Kevan and *Humpatella*, together with a number of phallic characters suggest closer affinity with other *Chlorizeinini* than with any other group. The two little-known genera seem to represent relicts of a more widely distributed group that diverged from typical *Chlorizeinini* at an early date.

Some of the phallic structures of *K. enigmatica* have already been illustrated by Kevan (*In* Kevan and Akbar, 1964).

TRIBE 19. POEKILO CERINI.

(Figs. 48, 49).

- [Sous]division Poecilocères [of "sous-genre" *Dictyophorus*] Brullé, 1835, *In* Audouin and Brullé, *Hist. nat. Ins.*, IX (5) [1]: 220 [see also Kevan, 1964, *Bull. zool. Nomencl.*, XXI, 377].
- [Famille Acridites] Division Truxalides Audinet-Serville, 1838, *Hist. nat. Ins. Orth.* [= *Coll. des Suites à Buffon* (7)], 565, 578 (*partim*) [see also Kevan, 1964, *Bull. zool. Nomencl.*, XXI, 377].
- [Unterfamilie, Conophoren] Unterabtheilung *Poeciloceridae* (Sektion *Phymat[e]idae*) Burmeister, 1840, *Z. Ent. (Germar)*, II, 45 (*partim*) [see also Kevan, 1953, *Spec. Pap. Univ. Nottm. Sch. Agric. Zool. Sect.*, I, 1, 2, 3, 4, 5, 6, 7, 9, and Kevan, 1964, *Bull. zool. Nomencl.*, XXI, 378, 379, 381, 383, and Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1506, also spelt *Poekiloceridae**].
- [Geslacht *Acridium* Groep] *Poecilocerus* [or] *Decticus* Haan, 1842, *In* Temminck, *Verh. natuurl. Gesch. Ned. overz. Bezitt.*, XVIII (Zool., 7), 145 (*partim*).
- Poeciloceridae* Scudder, 1868, *Smithson. misc. Coll.*, CLXXXIX, 87 (*partim*) [see also Kevan, 1952, *Ent. mon. Mag.*, LXXXVIII, 272 — spelt also *Poekiloceridae*]; Thomas, 1873, *Rep. U. S. geol. Surv. Terr.*, V (1), 37 (*partim*).
- [Fam. *Acrididae*] Limited Fam. *Phymat[e]idae*, Walker, 1870, *Cat. Derm. Salt. Brit. Mus.*, III, 539 (*partim*).
- Fam. *Phymat[e]idae* Walker, 1871, *Cat. Derm. Salt. Brit. Mus.*, V (Suppl. 3), 101 (*partim*).
- Poeciloceri* Stål, 1873, *Öfv. K. svensk. VetenskAkad. Förh.*, XXX (4), 51 (*partim*).
- Sub-tribus [and sub-tribu] *Poecilocerae* Bolívar, 1884, *An. Soc. esp. Hist. nat.*, XII, 20, 24, 447 (*partim*) [see also Kevan, 1964, *Bull. zool. Nomencl.*, XXI, 378, 379, 381; Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1508].
- Tribus *Pyrgomorphii*, Stirps *Poecilocera* Saussure, 1899, *Abh. Senckenb. Naturf. Ges.*, XXI, 643 (*partim*) [no true *Poekilocerini* referred to].
- Podsemeštvo *Poecilocerini* Jakobson, 1902, *In* Jakobson and Bianki, *Pryamokr. Lozhnesêchatokr. Ross. Imp.*, 171, 291 (*partim*).
- Subfam. *Poecilocerinae* Bolívar, 1904, *Bol. Soc. esp. Hist. nat.*, IV, 432 (*partim*) [see also Kevan, 1953, *Spec. Pap. Univ. Nottm. Sch. Agric. Zool. Sect.*, I, 5, 7, 9].
- Sect. *Poeciloceri* Bolívar, 1909, *Gen. Ins.*, XC, 4, 20 (*partim*).
- Group. *Poeciloceri* Powers, 1942, *J. Morph.*, LXXI, 526.
- Tribe *Poekilocerini* Rehn, 1951, *Ent. News*, LXII, 241, 242, 243, 244

* Validated without precedence over *Pyrgomorphidae*; Official List of Family Names in Zoology, no. 465: *Bull. zool. Nomencl.*, XXVIII, 88, 89, 91 (1971).

(*partim*); 1953, *Trans. Amer. ent. Soc.*, LXXIX, 100 (*partim*); 1953, *Grassh. Locusts Austral.*, II, 21, 24, 25, 26, 52, 53, 54 (*partim*); Uvarov, 1953, *Publ. cult. Cia. Diam. Ang.*, XXI, 210; Kevan, 1957, *Opusc. ent.*, XXII, 199 (*partim*); Fishelson, 1960, *Eos*, Madrid, XXXVI, 56 (*partim*), but only type genus referred to); Kevan, 1961, *Ent. mon. Mag.*, XCVI (1960), 204 (*partim*); Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1507, fig. 1 (map), 1521, 1524, 1525, 1528; Kevan, 1964, *Bull. zool. Nomencl.*, XXI, 381; 1965, *Proc. XII Int. Congr. Ent.* 1964, 442; Akbar, 1966, *Sind. Univ. Sci. Res. J.*, II, 5, 1968, *Ibid.*, III, 125; Kevan, 1969, *Bull. zool. Nomencl.*, XXVI, 73; Key, 1969, *Austr. J. Zool.*, XVII, 353; Kevan, Akbar and Chang, 1969, *Eos*, Madrid, XLIV (1968), 217; 1970, *Ibid.*, XLV (1969), 176.

Poecilocerini [status unspecified], Kevan, 1953, *Spec. Pap. Univ. Nottm. Sch. Agric. Zool. Sect.*, I, 5.

Group *Poeciloceri* Johnston, 1956, *Annot. Cat. Afr. Grassh.*, 162 (*partim*).

Note: Names based on *Poecilocerus* Audinet-Serville, 1831, prior to "*Poecilocerae*" Bolivar, 1884, should not be regarded as being coordinate with the tribal name — see Kevan (1964).

External features: Body large and robust, subfusiform; integument rather smooth to somewhat granular or slightly pustulate; coloration very variable but green never predominating, often multicoloured; pronotum never beset with spines or prominent tubercles, mesosternal lobes widely spaced, this interspace not narrower than a lobe; tegmina and hind wings always well developed, usually surpassing the abdomen, tegmina usually tessellated, occasionally rather uniformly dark or testaceous, hind wings brightly coloured, usually orange; hind femora, if maculate, without a spot on the inner face; male cerci simple, conical.

Principal phallic characters: Epiphallus with rather uniformly narrow lateral plates and a narrow bridge (latter usually with a small median process on the posterior and sometimes the anterior margin), anterior processes of variable size but strongly divergent, appendices rather closely applied to lateral plates; ectophallus pear-shaped, central membrane comparatively rather small, zygoma with posterior margin produced or not, suprazygomal plate large, broadly tongue-like, basal emargination distinct and fairly deep, but not very large, basal thickening collar-like, apodemal plates in lateral view with ventral processes, suprarami without inflections, valves of cingulum small but distinct, rather elongate, not denticulate, ventral process of cingulum usually triangular, ventral longitudinal thickenings rather heavy and straight; aedeagal sclerites heavy, somewhat short and rather straight, endophallic apodemes somewhat produced anteriorly, without or with indistinct

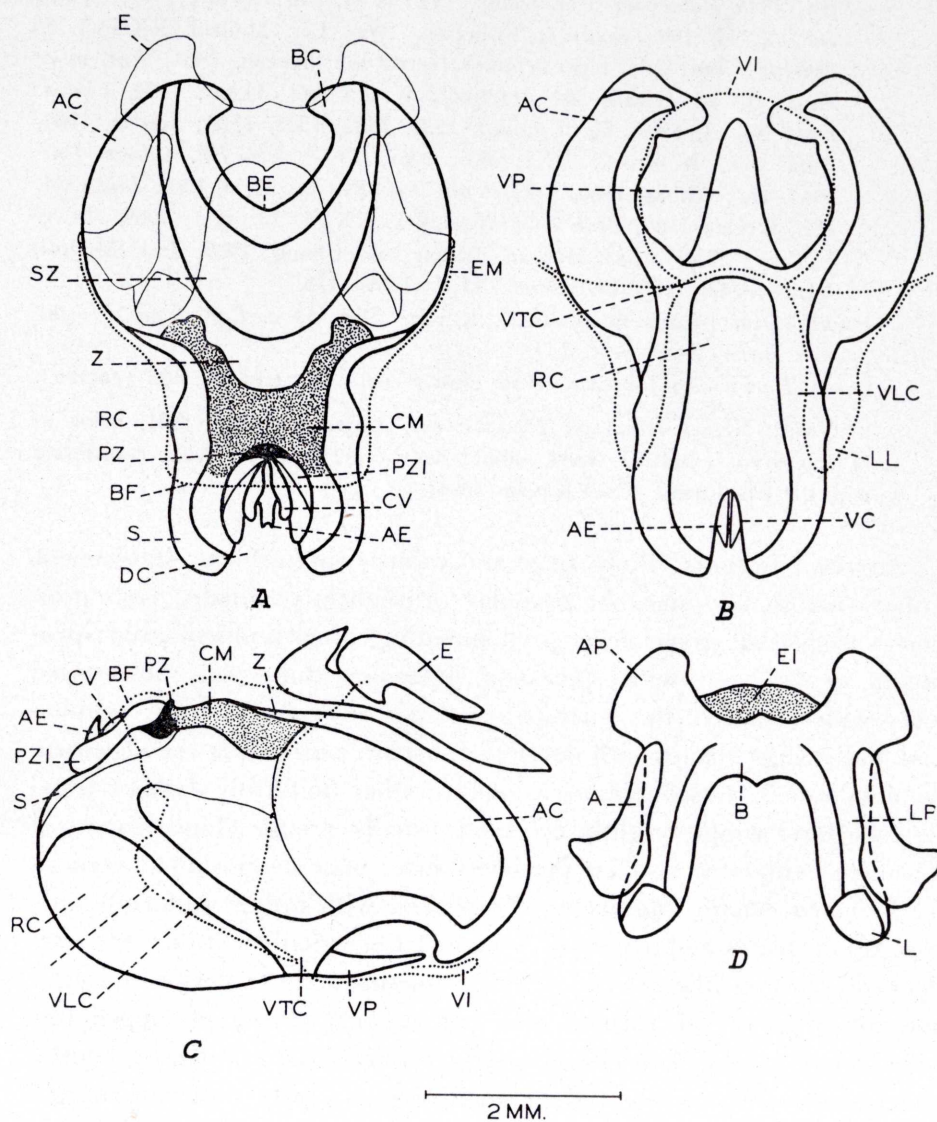


Fig. 48 a.—*Poecilocerini*: *Poecilocerus pictus* (Fabricius), phallic structures. A-D, as in Fig. 1. For notation, see pp. 223-225.

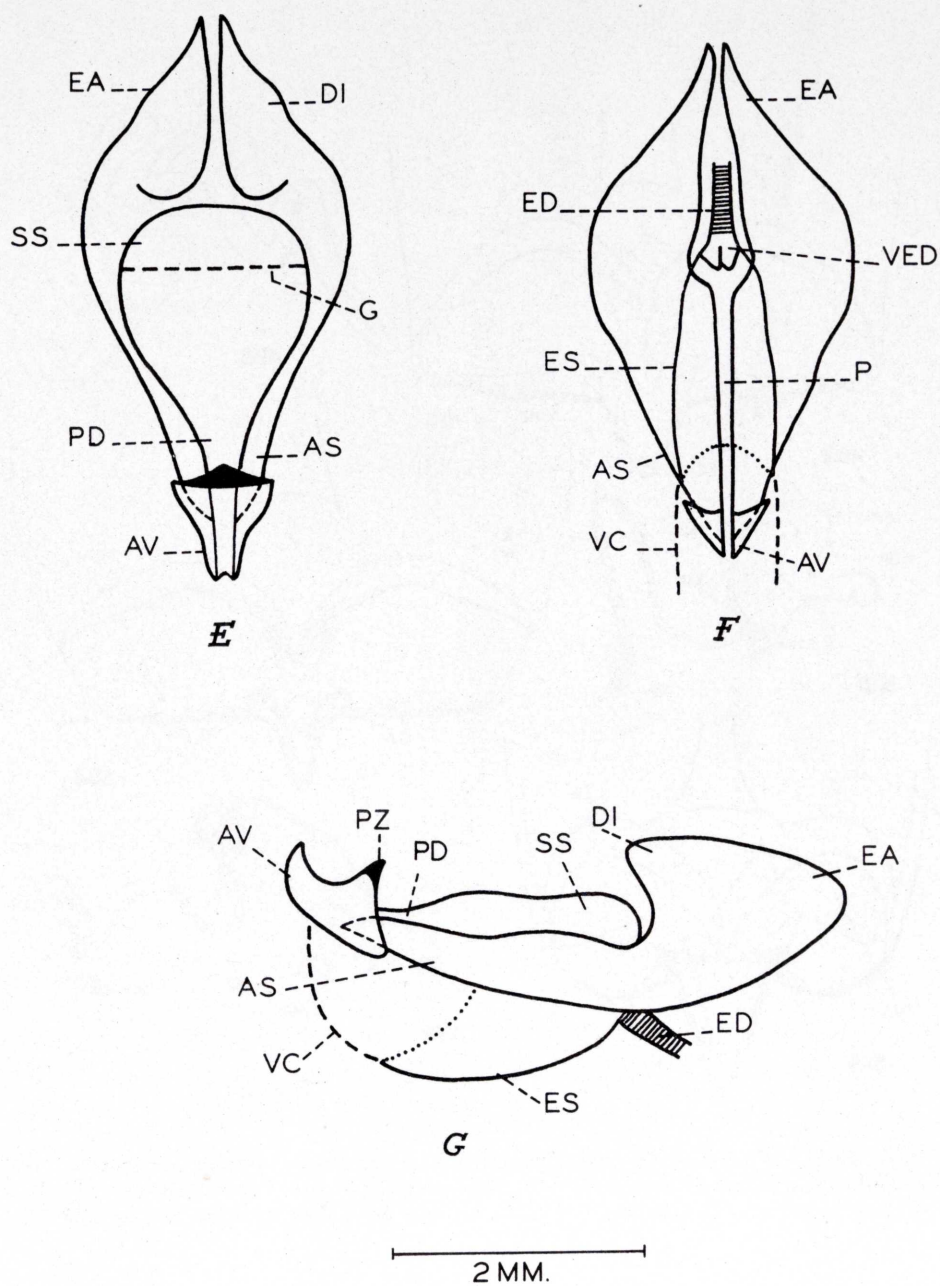
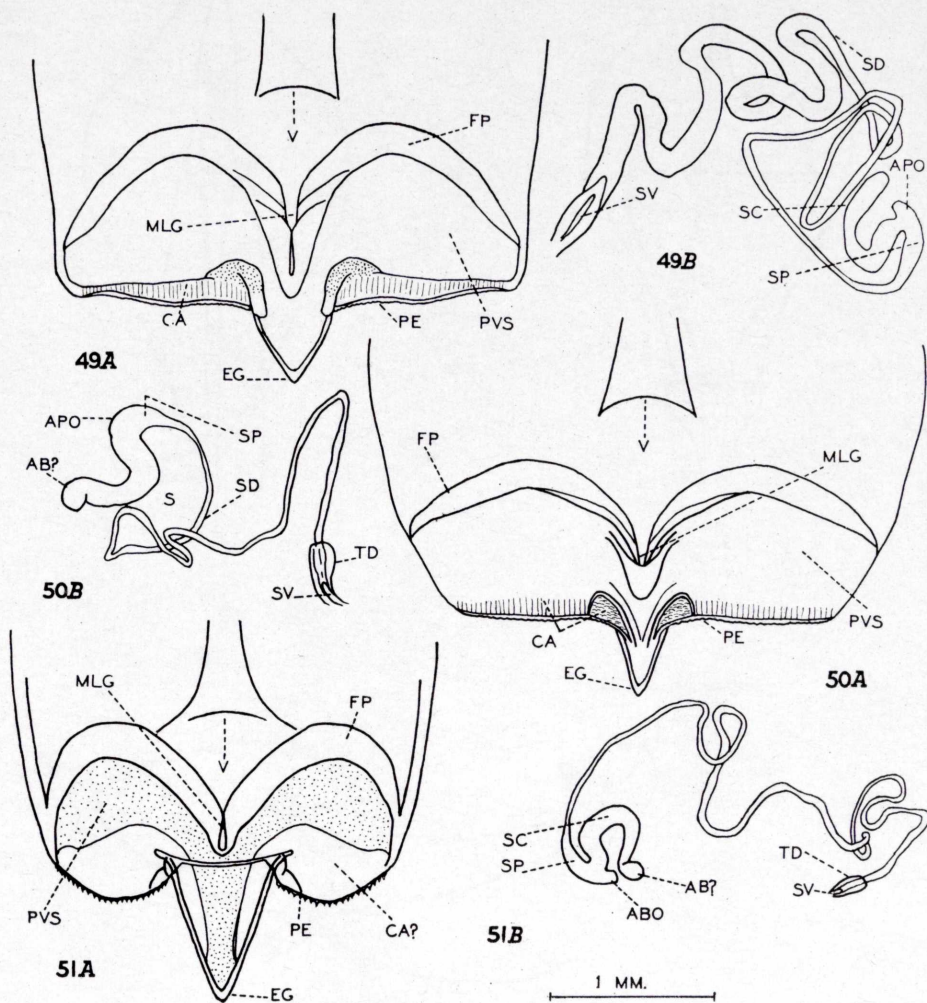


Fig. 48 b.—*Poecilocerini*: *Poecilocerus pictus* (Fabricius), phallic structures. E-G, as in Fig. 1. For notation, see pp. 223-225.



Figs. 49-51.—*Poecilocerini* and *Phymateini* (*Zonocerina*), female structures: 49) *Poecilocerus pictus* (Fabricius); 50) *Physemophorus sokotranus* (Burr); 51) *Zonocerus variegatus* (Linnaeus). A-G, as in Figs. 4-6. For notation, see pp. 223-225.

ventral processes, spermatophore sac simple, fairly large, pyriform, pseudoarch small but well developed, aedeagal valves short, conical, slightly or distinctly curved upwards apically.

Concealed female structures: Subgenital plate with posterior margin transverse, slightly serrated, egg-guide broadly triangular with columella-like thickenings at the base, true contact areas not developed but the submarginal zone in front of the posterior edge thickened; spermathecal vesicle with a prominent apical pocket, U-shaped caecum without an appendage, spermathecal duct moderately long, tube long, terminal dilation not developed.

Distribution: N. India, Eremian parts of SW. Asia and Africa north of the Equator.

Included genus: *Poekilocerus* Audinet-Serville, 1831.

Species examined: *Poekilocerus pictus* (Fabricius, 1775) [= *sonneratii* Audinet-Serville, 1831 = *tessellatus* Bolívar, 1904] (N. India, [W.] Pakistan, Afghanistan — Figs. 48, 49) [Type species]; *P. arabicus* Uvarov, 1922 (S. Arabian peninsula); *P. bufonius bufonius* (Klug, 1932) [= *vulcanus* Audinet-Serville, 1838] (Syria, Israel, Jordan, N. Arabia and N. Egypt); *P. b. vittatus* (Klug, 1932) [= *punctiventris* Audinet-Serville, 1838] (C. and S. Arabia, E. Sudan, northern Somalilands, drier parts of Ethiopia); *P. b. hieroglyphicus* (Klug, 1932) [= *polymita* Percheron, 1835 = *calotropidis* Karsch, 1888, *nec auctt.*] (C. Sudan to N. Nigeria and Mauritania)¹¹.

Other species: None known.

This tribe formerly included many genera since removed from it, including the *Monistriüni* (Series V), the differences from which have

¹¹ Examination of the type specimens of *Poekilocerus* indicates the following: *P. tessellatus* is merely the last-instar nymph of *P. pictus* (syn. nov.); *P. punctiventris* is a full synonym of *P. vittatus* (syn. nov.); *P. calotropidis* is merely a pale form of *P. hieroglyphicus*, not of *P. vittatus* as it has often been considered to be. The other synonymies have previously been indicated. *P. vittatus* and *P. bufonius* are certainly conspecific, the latter being much darker in colour and having a more arched pronotum and somewhat shorter tegmina; it is confined to the northern part of the range of the species, and as its name has page priority, it is adopted here for the species as a whole. The more southerly form is very variable in coloration, some examples being extremely pale (confused in the past with ab. *calotropidis* of *P. b. vittatus*), but the variants seem to be ecological, not geographical, so that no subspecific status should be afforded to them. *P. hieroglyphicus* also seems to be conspecific, although a little more distinctive — D. K. K.

already been discussed, and several of the genera in the previous tribe, as well as *Rubellia* Stål (*Sphenariini*, Series IX). The one genus now remaining in the tribe stands rather apart from other *Pyrgomorphidae*, in spite of superficial resemblances. It is obviously of considerable antiquity, as indicated by its geographical distribution. Its concealed copulatory structures show it to be related to the *Chloriscinini* (in external morphology, *Katangacris*, apart from its small size, is fairly similar) and the *Phymateini* (with which the female structures in particular are in reasonably close agreement).

No revision of the single well known genus, *Poecilocerus*, has yet appeared although one by Mr. G. Popov and most senior author is in an advanced stage of preparation.

The first published information on the copulatory structures of *Poecilocerus* is that of Slifer (1940) who illustrates the spermatheca of *P. [bufonius] vittatus* [the figure is repeated by Uvarov (1948; 1966)]. The epiphallus of *P. pictus* is figured by Dirsh (1956; 1965) and Akbar (1966 a), the latter illustrating also the subgenital plate of the female. A more comprehensive account of the phallic structures of *P. pictus* is given by Latif, Haque and Khan (1959) and this has been revised by Akbar (1965; 1966 b) and by Wasti and Akbar (1970). The last authors (1969) also describe the phallic musculature.

TRIBE 20. PHYMATEINI.

(Figs. 50-64; Pl. IX).

[Sous-]division Phymatées [of "sous-genre" *Dictyophorus*] Brullé, 1835, *In* Audouin and Brullé, *Hist. nat. Ins.*, IX (5) [1], 220 [see also Kevan, 1964, *Bull. zool. Nomencl.*, XXI, 377].

[Famille Acridites] Division Conophori, Audinet-Serville, 1838, *Hist. nat. Ins. Orth.* [= *Coll. des Suites à Buffon* (7)], 566, 603 (*partim*) [see also Kevan, 1964, *Bull. zool. Nomencl.*, XXI, 377].

[Unterfamilie Conophoren] Unterabtheilung *Poeciloceridae* (Sektion *Phymat[e]idae*) Burmeister, 1840, *Z. Ent. (German)*, II, 45, 46 (*partim*) [see also Kevan, 1953, *Spec. Pap. Univ. Nottm. Sch. Agric. Zool. Sect.*, I, 1, 2, 3, 4, 5, 6, 7, 9, and Kevan, 1964, *Bull. zool. Nomencl.*, XXI, 378, 379, 380, 381, 383, and Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1506 — also spelt *Phymateidae* *].

* Validated without precedence over *Pyrgomorphidae*; Official List of Family Group Names in Zoology, no. 466: *Bull. zool. Nomencl.*, XXVIII, 88, 89, 91 (1971).

- [Geslacht *Acridium*, Groepen] *Poecilocerus* and *Phymateus* [or] *Petasia* Haan, 1842, *In* Temminck, *Verh. natuurl. Gesch. Ned. overz. Bezitt.*, XVIII (Zool., 7), 145 (*partim*).
- Xiphoceridae* Scudder, 1868, *Smithson. misc. Coll.*, CLXXXIX, 87 (*partim*).
- Phymat[e]idae* Scudder, 1868, *Smithson. misc. Coll.*, CLXXXIX, 87 (*partim*) [see also Kevan, 1952, *Ent. mon. Mag.*, LXXXVIII, 272], Thomas, 1873, *Rep. U. S. geol. Surv. Terr.*, V (1), 37 (*partim*); Seoane, 1878, *Orth. Spanisch-Portugies. Halbinsel*, Stettin, 12 (*partim*), Schoch, 1878, *Mitt. schweiz. ent. Ges.*, V, 366 (*partim*) [no members of tribe included]; Mayné, 1917, *Étude Biol. agric. Min. Colon. Serv. agric. Belg.*, III, 1-80; 1918, *Rev. appl. Ent.* (A), VI, 79.
- [Fam. *Acrididae*] Limited Fam. *Phymat[e]idae* Walker, 1870, *Cat. Derm. Salt. Brit. Mus.*, III, 539 (*partim*).
- Fam. *Phymat[e]idae* Walker, 1870, *Zoologist* (2), V, 2278 (*partim*) [no members of tribe included]; 1871, *Cat. Derm. Salt. Brit. Mus.*, V (Suppl., 3), 101 (*partim*).
- Subfam. *Phymat[e]idae* Stål, *Recens. Orth.*, I, 3, 8 (*partim*); 1876, *K. svensk. Vet. Akad. Handl.*, IV (5), 34 (*partim*).
- Group *Phymat[e]ini* Thomas, 1873, *Rep. U. S. geol. Surv. Terr.*, V (1), 39, 41, 178, 181 (*partim*) [see also Kevan, 1964, *Bull. zool. Nomencl.*, XXI, 378].
- Zunft der *Phymat[e]iden*, Brunner von Wattenwyl, 1874, *Verh. zool. bot. Ges. Wien*, XXIV, 225, 227 (*partim*) [see also Kevan, 1964, *Bull. zool. Nomencl.*, XXI, 379, 380, 383].
- Tribus Fimatinos Bolívar, 1876, *An. Soc. esp. Hist. nat.*, V, 281, 282 (*partim*).
- Groupe *Phymat[e]ini* Girard, 1876, *Traité élém. Ent.*, II (1), 254 (*partim*) [see also Kevan, 1964, *Bull. zool. Nomencl.*, XXI, 378].
- Phymatinées, Marguet, 1877, *Bull. Soc. Hist. nat. Toulouse*, 1876-77, 143 (*partim*).
- Tribu Fimatini, Targioni-Tozzetti, 1883, *Ann. Agric. Firenze & Roma*, 1883, 34 (*partim*).
- Sub-tribus [and "sub-tribu"] *Phymateae* Bolívar, 1884, *An. Soc. esp. Hist. nat.*, XIII, 20, 25, 453 [see also Kevan, 1952, *Spec. Pap. Univ. Nottm. Sch. Agric. Zool. Sect.*, I, 8, and Kevan, 1964, *Bull. zool. Nomencl.*, XXI, 379, 381].
- Subfam. *Phymat[e]inae* Kirby, 1889, *Trans. Linn. Soc. London* (2), Zool., V, 97 (*partim*) [see also Kevan, 1953, *Spec. Pap. Univ. Nottm. Sch. Agric. Zool. Sect.*, I, 1, 4, 5, and Kevan, 1964, *Bull. zool. Nomencl.*, XXI, 379, 380]; 1902, *Proc. zool. Soc. London*, 1902, 97; 1902, *Trans. ent. Soc. London*, 1902, 82.
- Tribus *Pyrgomorphii* Stirps *Phymateus*, Saussure, 1899, *Abh. Sensckenb. naturf. Ges.*, XXI, 643 (*partim*).
- Semeïstvo *Phymateidae* Yakobson, 1902, *In* Yakobson and Bianki, *Pryamokr. Lozhnosêchatokr. Ross. Imp.*, 287 (*partim*); Sharp and Kuznetzov, 1910, *Nasêkomîya* (*Insects* by David Sharp, *Camb. Nat. Hist.*,

- vols. IV and V), V, 182, 187 (*partim*). Pavlovskii (Pawlowsky), 1916, *In Dogel' (Dogiel) and Sokolov (Sokolow), Nauchn. Rez. zool. Éksped. Brit. Vost. Afr. Ug.*, 1914, I (3), 1, 3, 23.
- Subfam. *Phymateinae* Bolívar, 1904, *Bol. Soc. esp. Hist. nat.*, IV, 401 [see also Kevan, 1952, *Ent. mon. Mag.*, LXXXVIII, 271, and Kevan, 1953, *Spec. Pap. Univ. Nottm. Sch. Agric. Zool. Sect.*, I, 1, 4, 5, and Kevan, 1964, *Bull. zool. Nomencl.*, XXI, 379, 380].
- Subfam. *Poecilocerinae* Bolívar, 1904, *Bol. Soc. esp. Hist. nat.*, IV, 432 (*partim*) [includes *Poecilocerus* (= *Physemophorus*) *sokotranus*].
- Sect. *Phymatei* Bolívar, 1909, *Gen. Ins.*, XC, 4, 16 [see also Kevan, 1953, *Spec. Pap. Univ. Nottm. Sch. Agric. Zool. Sect.*, I, 8]; Uvarov, 1922, *Ann. Mag. nat. Hist.* (9), IX, 111.
- Sect. *Poeciloceri* Bolívar, 1909, *Gen. Ins.*, XC, 4, 21 (*partim*) [includes *Poecilocerus* (= *Physemophorus*) *sokotranus*].
- [Subfam.] *Phymateinae* Kevan, 1952, *Ent. mon. Mag.*, LXXXVIII, 271 (*partim*) [see also Kevan, 1953, *Spec. Pap. Univ. Nottm. Sch. Agric. Zool. Sect.*, I, 1, 4, 5].
- Phymateini* Kevan, 1953, *Spec. Publ. Univ. Nottm. Sch. Agric. Zool. Sect.*, I, 5.
- Group *Phymatei* Johnston, 1956, *Annot. Cat. Afr. Grassh.*, 144 (*partim*); Dirsh, 1962, *Eos*, Madrid, XXXVIII, 43.
- Group *Poeciloceri* Johnston, *Annot. Cat. Afr. Grassh.*, CLXII (*partim*) [includes *Physemophorus*].
- Phymatei* Blackith and Verdier, 1960, *Bull. Soc. ent. Fr.*, LXV, 266.
- Tribe *Phymatei* Dirsh, 1962, *Eos*, Madrid, XXXVIII, 43.
- Tribe *Phymateini* Kevan, 1964, *Bull. zool. Nomencl.*, XXI, 381; Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1507, fig. 1 (map), 1520, 1524, 1525; Akbar, 1966, *Sind Univ. Sci. Res. J.*, II, 5; Kevan, Akbar and Chang, 1969, *Eos*, Madrid, XLIV (1968), 217; 1970, *Ibid.*, XLV (1969), 176.
- Note: Names based on *Phymateus* Thunberg, 1815, prior to "*Phymateae*" Bolívar, 1884, should not be regarded as being co-ordinate with the tribal name — see Kevan (1964).

External features: Body of moderate to, more usually, large or very large size (the largest *Pyrgomorphidae* are included here), usually robustly built, often bulky; integument either rather smooth, or, in most genera, rugose, coloration variable, often striking, abdomen usually annulated yellow to orange-red; fastigium of vertex short, obtuse, pronotum either smooth or beset with bosses or spines; sternal lamina with prosternal suture usually widely interrupted in middle, obsolescent, or lacking; mesosternal lobes widely spaced, their interspace wider than a lobe; tegmina and hind wings always present, generally large and well developed, but sometimes brachypterous or greatly reduced, tegmina

usually reticulate in appearance, hind wings pigmented, infuscated, greenish, bluish or multicoloured and tessellated; hind femora sometimes with a dark macula on the inner face; male cerci simple, conical.

Principal phallic characters: Epiphallus rather variable within the limits of the Series, but bridge not constricted in the middle, and often with a median process on the posterior margin; ectophallus pear-shaped or occasionally somewhat rectangular in dorsal view, central membrane of moderate extent, zygoma usually rather large with posterior margin convex, occasionally produced, suprazygomal plate moderately large but not surpassing posterior margin of zygoma, lateral margins usually slightly convex or sinuous, posterior margin truncated or sometimes slightly excavate, basal emargination, moderately deep, usually broadly V-shaped, sometimes semicircular, basal thickening collar-like, apodemal plates in lateral view usually rounded, sometimes with small ventral processes, suprarami with or without inflections, valves of cingulum usually prominent and somewhat elongate, not very large, not denticulate, sheaths often rather heavily sclerotized, forming a crypt in which the valves of this cingulum lie, ventral process of cingulum moderately large, triangular or tongue-like, ventral longitudinal thickenings not very prominent, sometimes obsolescent; aedeagal sclerites generally rather uniform, moderately stout, endophallic apodemes not produced anteriorly, only occasionally with small ventral processes, spermatophore sac simple, not very large, round or broadly pyriform or ovate, gonopore at or near the middle, pseudoarch usually poorly developed, aedeagal valves short and somewhat upwardly curved apically.

Concealed female structures: Subgenital plate with posterior margin transverse or indented on either side of the egg-guide, serrated or not, egg-guide triangular, usually rather prominent, sometimes with columella-like thickenings at the base, submarginal contact areas present or undeveloped; spermathecal vesicle usually with a prominent subapical pocket, caecum U-shaped, sometimes somewhat irregular, often continuing directly into a thick undifferentiated appendage; spermathecal duct of moderate length, terminal dilation usually long, sometimes reduced.

Distribution: Africa south of Sahara, Madagascar, Sokotra.

This tribe contains some of the best known of the large, showy African *Pyrgomorphidae* as well as some economically important species. The anomalous genus *Physemophorus* Krauss seems to provide a link with the *Poecilocerini*, both in general external appearance and

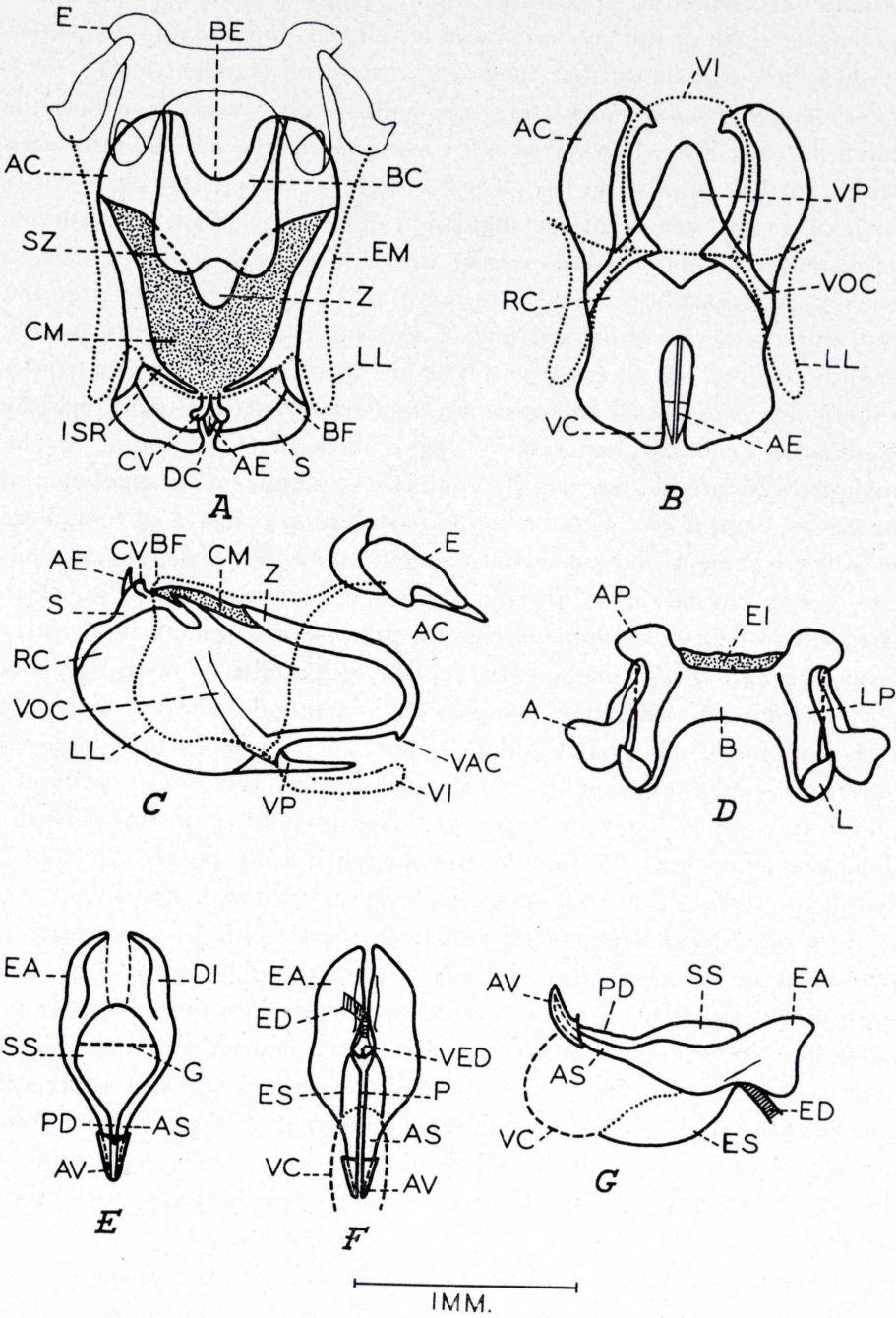


Fig. 52.—Phymatcini (Zonocerina): *Phymophorus sokotranus* (Burr), phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

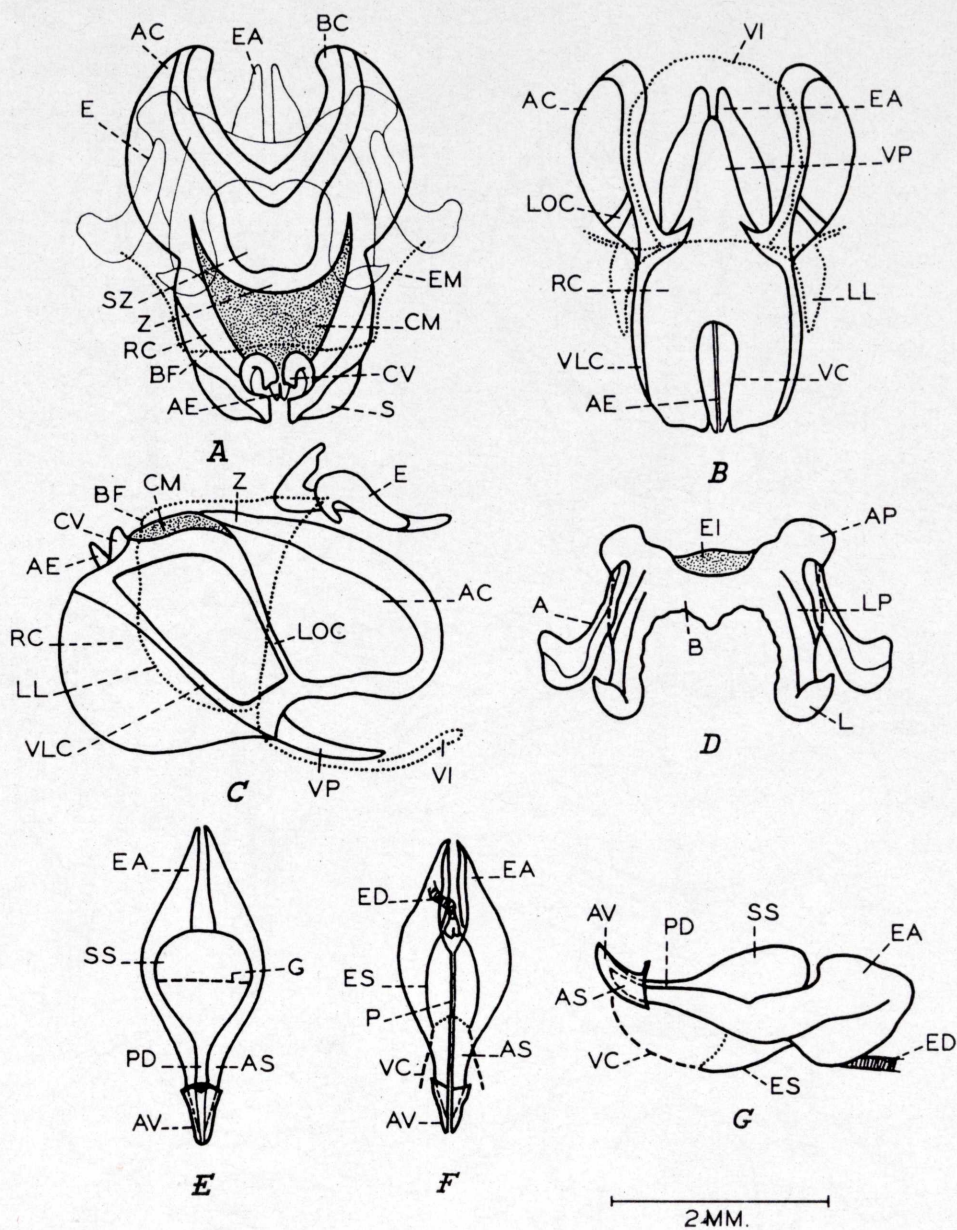


Fig. 54.—*Phymatcini* (*Phymatcina*): *Rutidoderes squarrosus* (Linnaeus), phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.

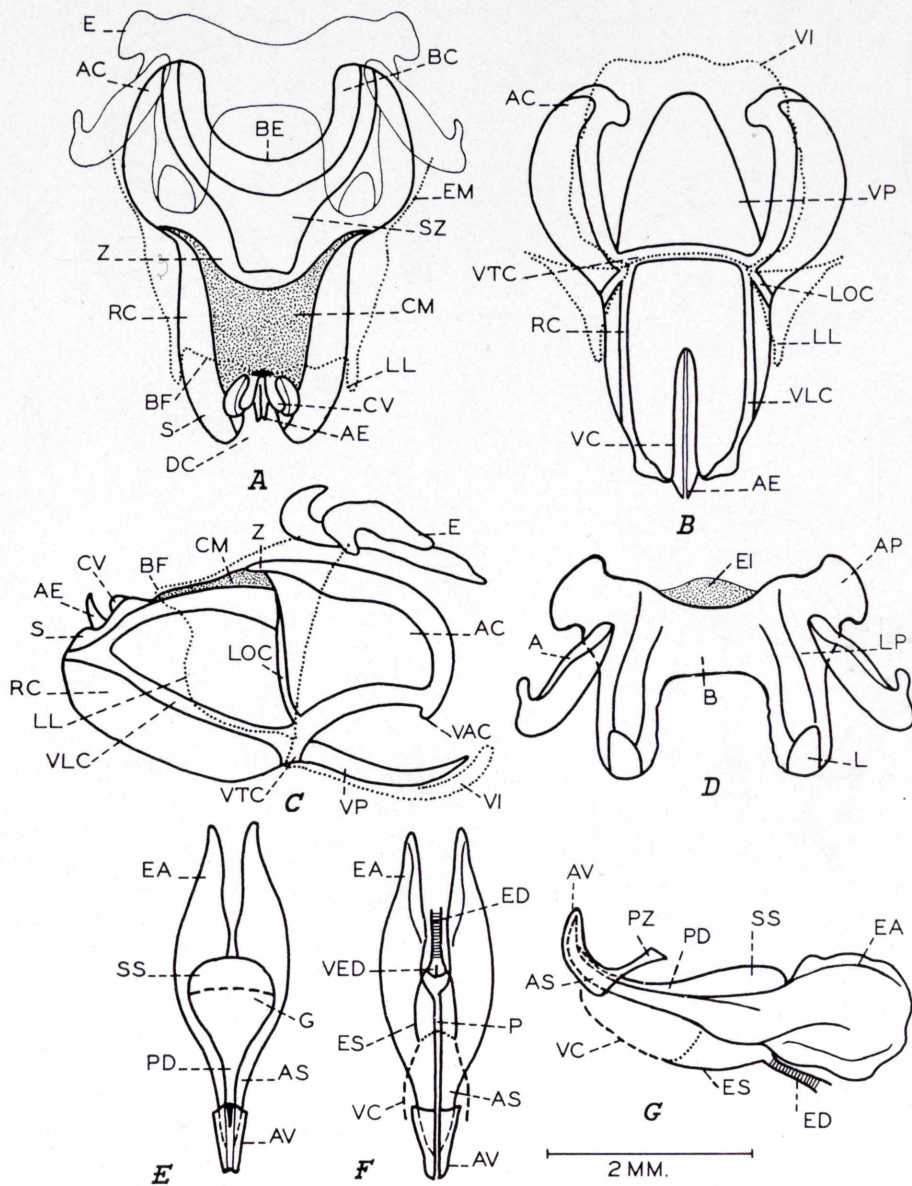
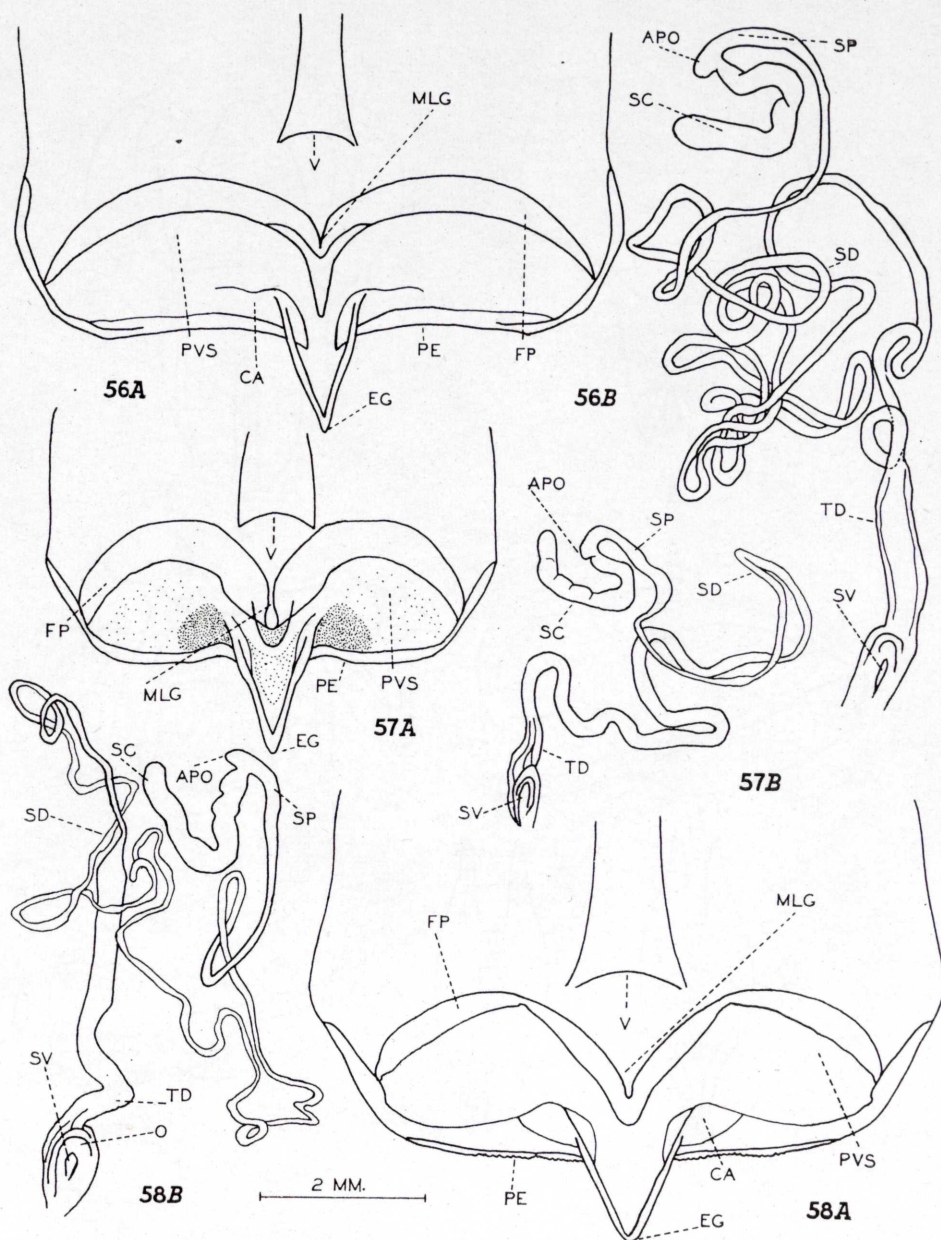
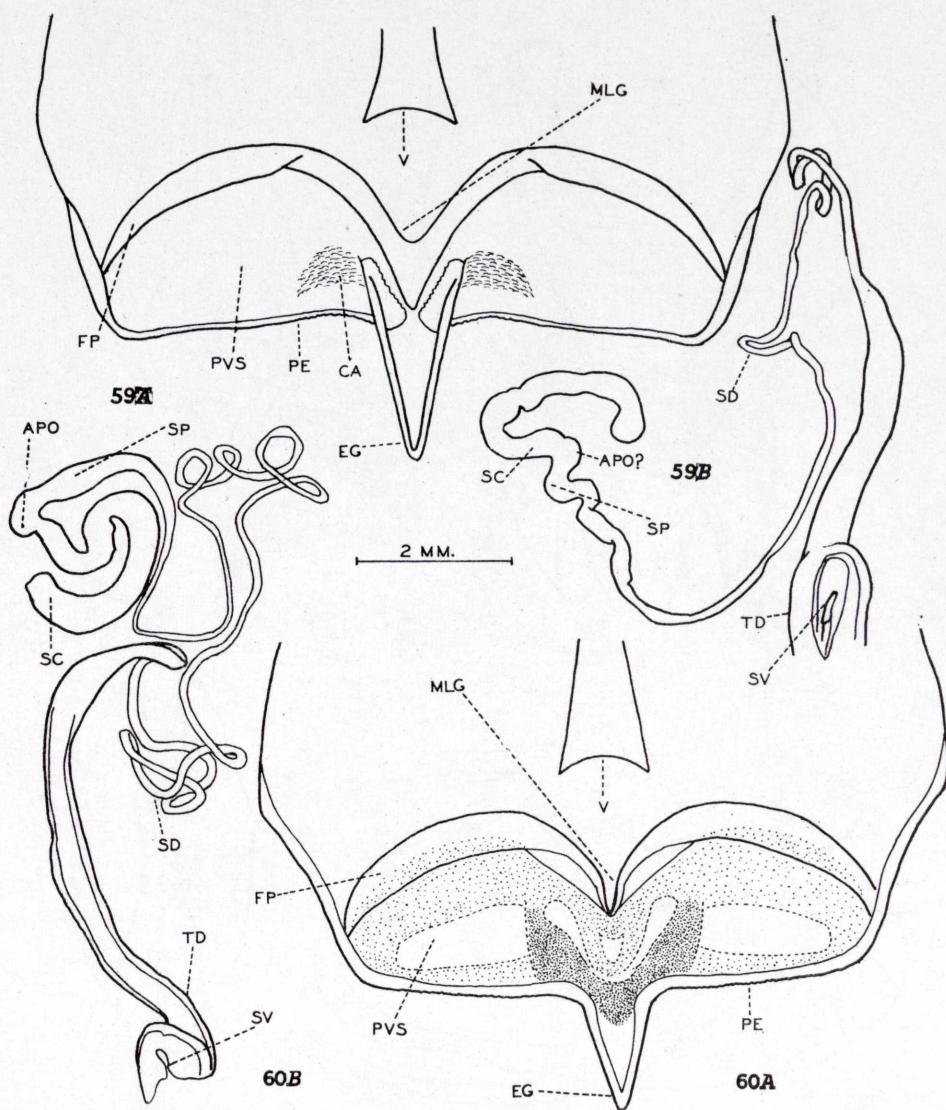


Fig. 55.—*Phymateini* (*Phymateina*): *Phyteumas purpurascens purpurascens* (Karsch), phallic structures. A-G, as in Fig. 1. For notation, see pp. 223-225.



Figs. 56-58.—*Phymateini* (*Phymateina*), female structures: 56) *Paraphymateus roffeyi* Dirsh, paratype; 57) *Rutidoderes squarrosus* (Linnaeus); 58) *Phyteumas purpurascens purpurascens* (Karsch). A-B, as in Figs. 4-6. For notation, see pp. 223-225.



Figs. 59-60.—*Phymateini* (*Phymateina*), female structures: 59) *Phyteumas olivaceus* (Karsch); 60) *Phymateus (Maphytus) leprosus* (Fabricius). A-B, as in Figs. 4-6. For notation, see pp. 223-225.

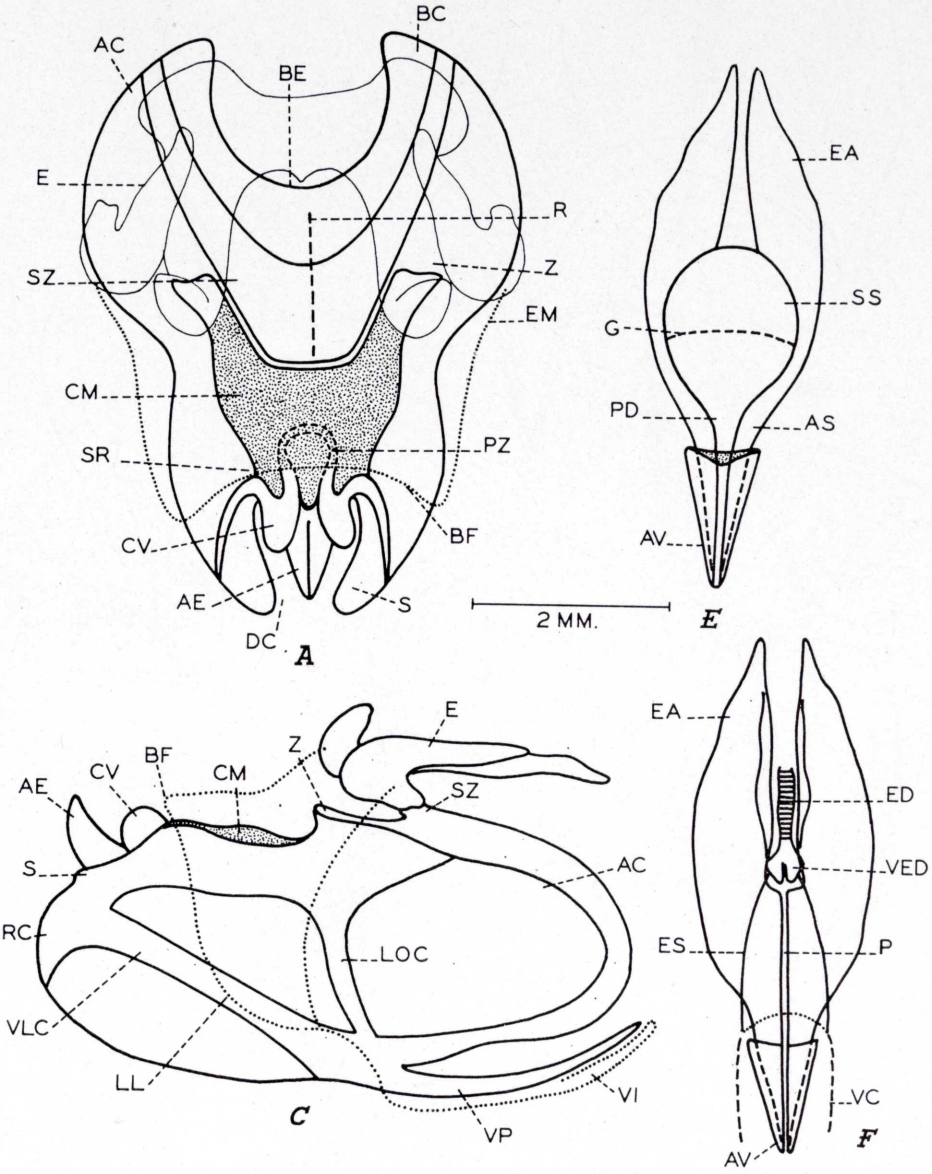


Fig. 61 a.—*Phymateini* (*Phymateina*): *Phymateus* (*Maphyteus*) *leprosus* (Fabricius), phallic structures. A, C, E and F, as Fig. 1. For notation, see pp. 223-225.

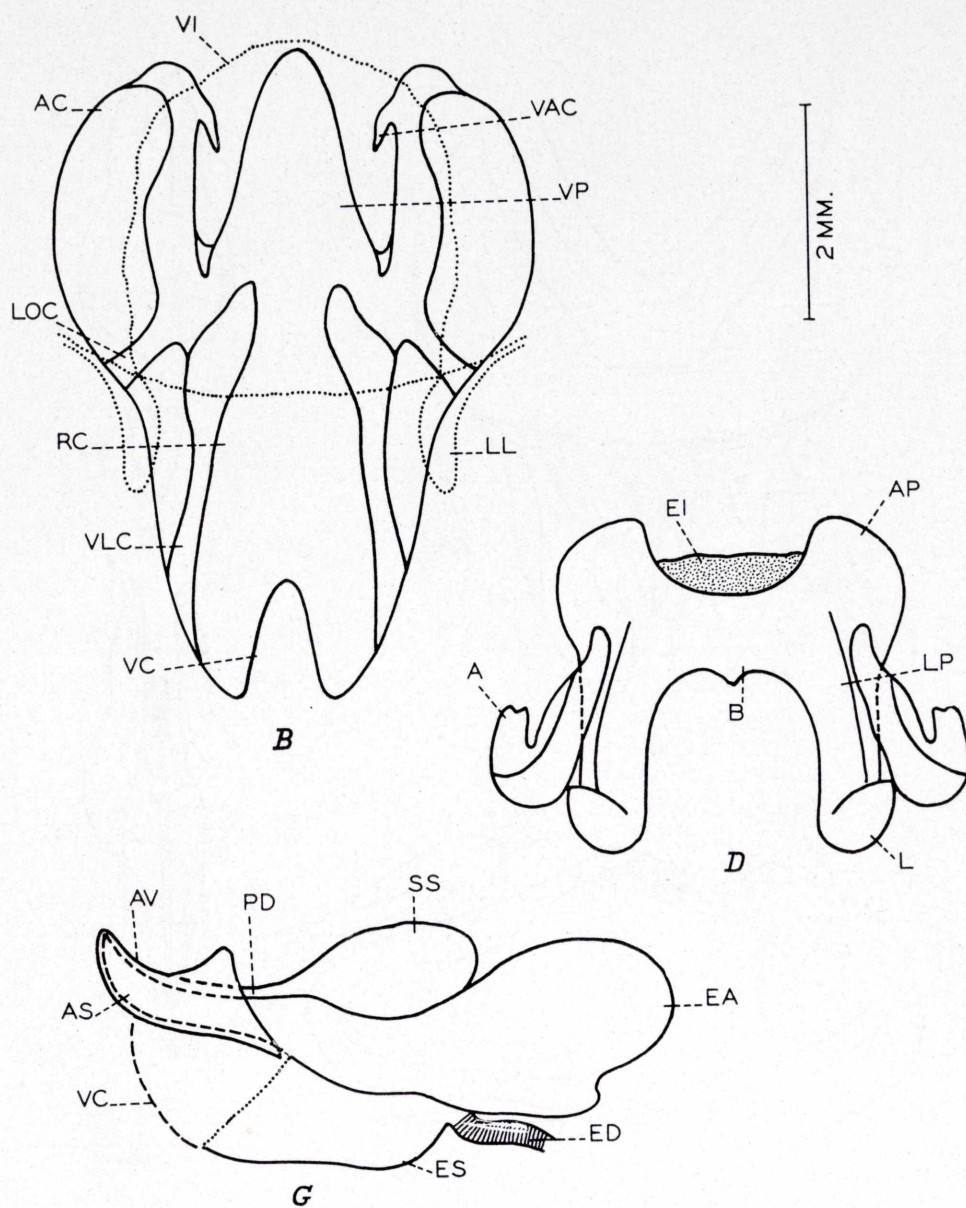


Fig. 61 b.—*Phymateini* (*Phymateina*): *Phymateus* (*Maphyteus*) *leprosus* (Fabricius), phallic structures. B, D and G, as in Fig. 1. For notation, see pp. 223-225.

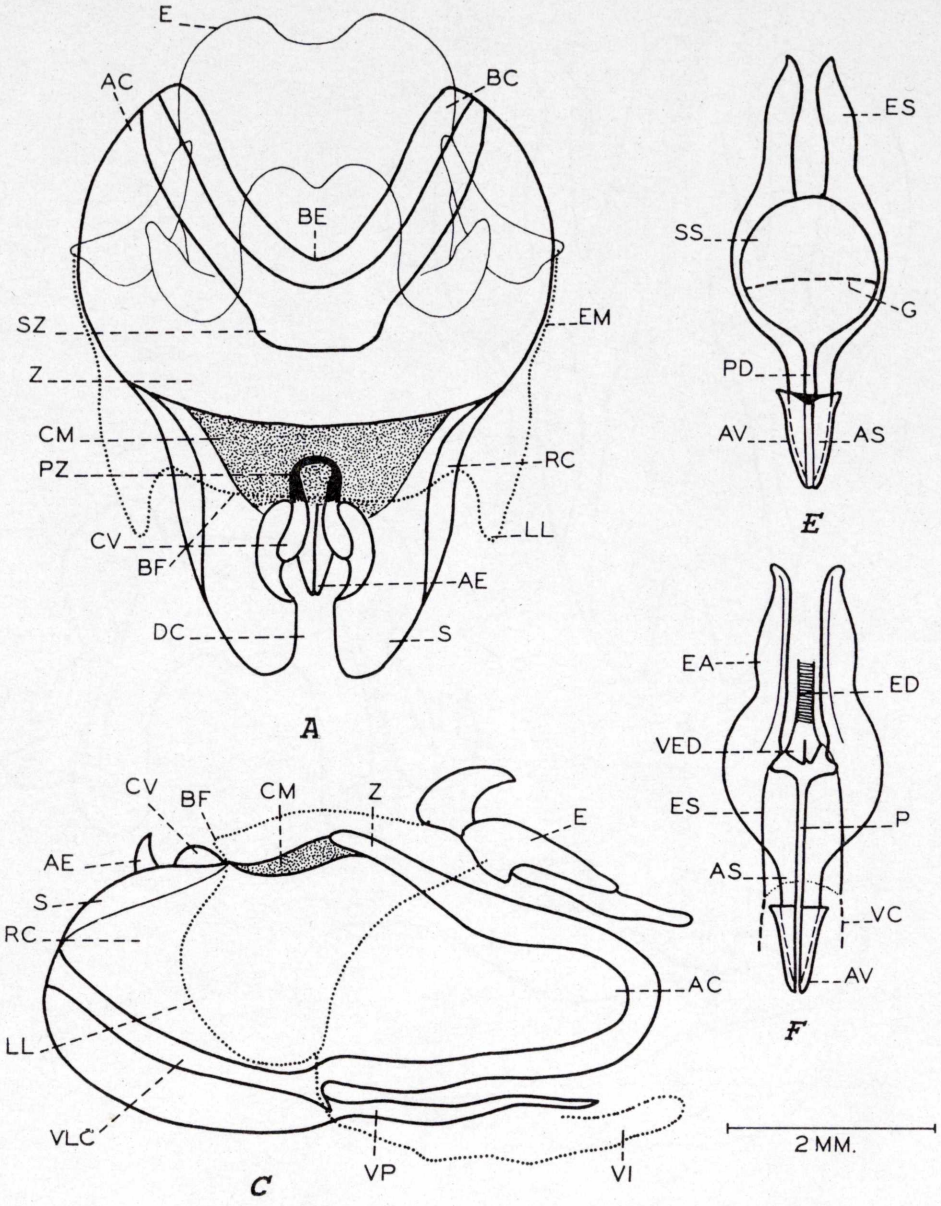


Fig. 62 a.—*Phymateini* (*Phymateina*): *Phymateus* (*Ph.*) *morbillosus morbillosus* (Linnaeus), phallic structures. *A*, *C*, and *F*, as in Fig. 1. For notation, see pp. 223-225.

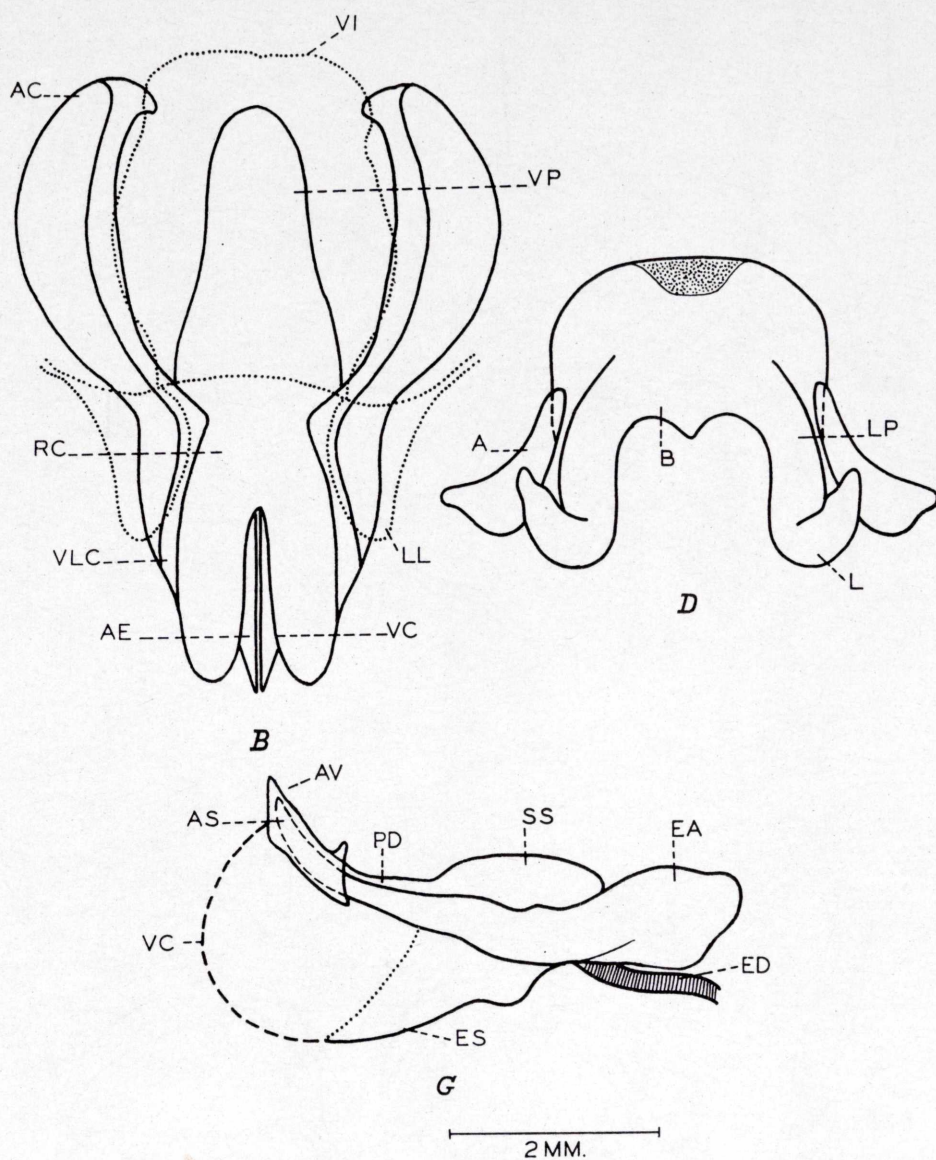
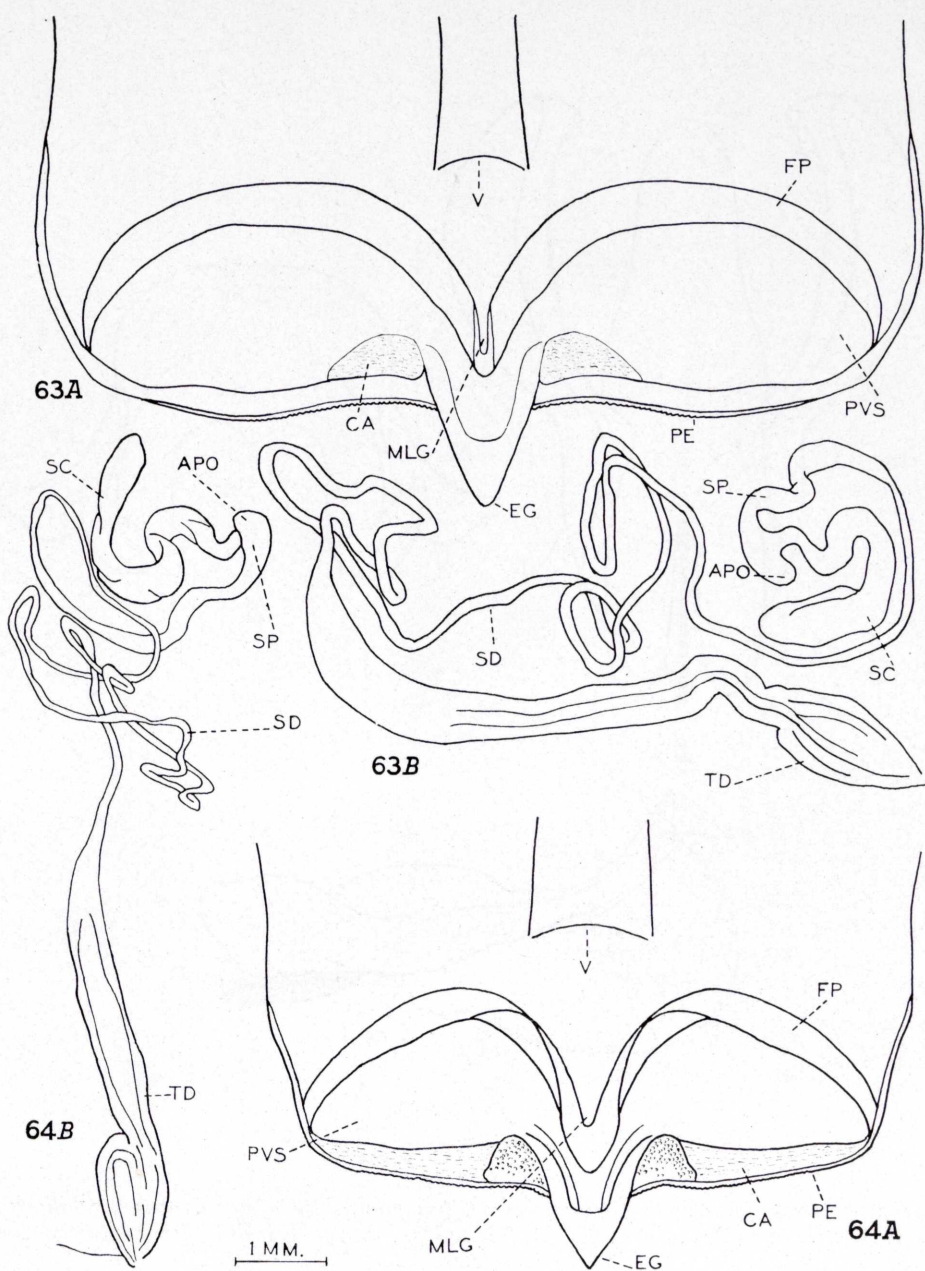


Fig. 62b.—*Phymateini* (*Phymateina*): *Phymateus* (*Ph.*) *morbillosus morbillosus* (Linnaeus), phallic structures. B, D and G, as in Fig. 1. For notation, see pp. 223-225.



Figs. 63-64.—*Phymateini* (*Phymateina*), female structures: 61) *Phymateus* (*Ph.*) *morbillosus morbillosus* (Linnaeus); 62) *Ph. (Ph.) viridipes* Stål. A, B, as in Figs. 4-6. For notation, see pp. 223-225.

in the female subgenital plate. Its phallic structures are rather peculiar and this, together with its isolated geographical distribution (it is confined to Sokotra), suggests that it might be placed in a separate subtribe or tribe. However, this would lead to the recognition of three monogeneric taxa, which would be undesirable, and, as its nearest relative would seem to be *Zonocerus* Stål, it is grouped here with that genus for the present.

Subtribe *a.* ZONOCERINA.

(Figs. 50-53, Pl. IX, figs. A-F).

Subfam. *Poecilocerinae* Bolívar, 1904, *Bol. Soc. esp. Hist. nat.*, IV, 432 (*partim*) [includes *Poecilocerus* (= *Physemophorus*) *sokotranus*].

Sect. *Poeciloceri* Bolívar, 1909, *Gen. Ins.*, XC, 4, 21 (*partim*) [as last].

Group *Poeciloceri* Johnston, 1956, *Annot. Cat. Afr. Grassh.*, 162 (*partim*) [includes *Physemophorus*].

Subtribe *Zonocerina* Kevan and Akbar, 1956, *Canad. Ent.*, XCVI, 1507, fig. 1 (map), 1521, 1525.

External features: Size moderate; pronotum smooth, dorsally convex, first abdominal tergum sometimes with a prominent median tubercle (*Physemophorus*), tegmina often somewhat to greatly abbreviated, even when fully developed, somewhat parted at the base when at rest; hind wings infumated or dull pink, not brightly coloured or tessellated; hind femur banded or with a large maculation, or variegated externally and with a prominent macula on the inner face.

Principal phallic characters: Epiphallus with lateral plates distinctly widened basally; ectophallus sometimes subrectangular in dorsal view (*Physemophorus*), with basal emargination of cingulum rather narrow, suprazygomal plate sometimes parallel-sided and emarginate apically (*Physemophorus*), valves of cingulum rather small, suprarami distinct, narrow or with prominent dorsal inflections, rami in ventral view sometimes broad and subrectangular and sheaths transverse (*Physemophorus*); endophallic apodemes angular in lateral view.

Concealed female structures: Subgenital plate similar to *Poecilocerini* (*Physemophorus*) or with posterior edge rather distinctly serrated and with egg-guide large and prominent; spermatheca sometimes without a distinct apical pocket (*Physemophorus*), terminal dilation of spermathecal duct short and inconspicuous.

Distribution: Africa south of Sahara, Sokotra.

Included genera: *Physemophorus* Krauss, 1907; *Zonocerus* Stål, 1873.

Species examined: *Physemophorus sokotranus* (Burr, 1898) (Sokotra — Figs. 50, 52, Pl. IX, figs. A, B) [Type species]; *Zonocerus variegatus* (Linnaeus, 1758) (Equatorial Africa — Fig. 51); *Z. elegans elegans* (Thunberg, 1815) (southern and eastern Africa — Fig. 53) [Type species]; *Z. e. angolensis* n. subsp.¹² (Angola — Pl. IX, figs. C-F).

¹² *Zonocerus elegans angolensis* new subspecies — Differs from the typical subspecies in being distinctly smaller (♂, 23-30; ♀, 33-42 mm. instead of about 30-40 and 37-55 mm. respectively), in having narrower, more parallel-sided, blunter tegminal vestiges than are usual (although not unknown) in the typical form (no macropterous example of the new subspecies is yet known), and in the head being differently pigmented. In the typical subspecies, the head is normally, for the most part, black dorsally and laterally, with comparatively little in the way of yellow markings (if present, these are less extensive than black and rather irregular); in the new subspecies, the dorsal aspect of the head appears largely yellowish with a median, longitudinal black stripe divided by a yellow carinula. Even when somewhat similar coloration is found in the typical subspecies there are additional black maculations. The phallic structures are indistinguishable from those of the typical subspecies.

Holotype, ♂; *Allotype*, ♀: Angola, Palavange, 2.xi.1930, 2nd Prentis Gray African Expedition (E. T. Green); [Academy of Natural Sciences of Philadelphia].

Measurements: length, ♂ 24, ♀ 33.5; pronotum, ♂ 6.1, ♀ 7.2; tegmen, ♂, 6.0×2.5 , ♀, 7.3×2.7 ; hind femur, ♂ 15.0, ♀, 16.0 mm.

Paratypes: 10 ♂♂, 2 ♀♀, same data as holotype and allotype [there are also 15 male and 6 female immature specimens with the same data, which it is not proposed to regard as paratypes. They are similar to those of the typical form except that comparable instars are smaller]; 1 ♂, 1 ♀, Angola, Miss. sci. Suisse, 1928-29, Vila da Ponte xii. [There is also available an immature ♀, Benguella, Dr. Wellman (no date) which presumably belongs to this subspecies (see also below)].

The distribution of this subspecies has not yet been fully determined, but it would now appear to be limited to elevated areas in SW. Angola. The type locality is about 70 miles north of Silva Porto, 4500 ft. Angola records of *Zonocerus elegans* are given by Dirsh (1965 a; 1966) for a number of localities, and specimens are also known as follows: Duque de Bragança (Bayão), 1 ♂, 1 ♀; Humbe (Anchieta), 1 ♀, 1 juv.; Quimbango, 1888 (Anchieta), 1 ♂ [all in the University of Lisbon]; Quango (Capello and Ivens), 1 ♂ [Madrid]. There is no evidence to indicate that any except Dirsh's material from Tchivinguiro belong to the present subspecies. Specimens from Caconda (Anchieta), 2 ♂♂ [1, Lisbon; 1, Madrid], 4 ♀♀ [3, Lisbon; 1, Madrid], however, probably belong to this subspecies, as

Other species: None known.

The genus *Paraphymateus* Dirsh, of which only the female is known, seems to link this subtribe with the next. Externally it somewhat resembles a warty, brachypterous *Z. elegans*, but its female structures seem nearest to those of *Phyteumas* Bolívar. As *Physemophorus* is monotypic and *Zonocerus* now contains only two well-known and easily distinguishable species (see Dirsh, 1966; 1970), there is no call for a general revision of this subtribe.

The first account of the concealed copulatory structures is that of Slifer (1940), who figures the spermatheca of *Z. elegans*. Agarwala (1954) mentions some features of the female subgenital plate of *Z. variegatus*, but he gives no figure. The various parts of the phallic complex of *Z. elegans* are illustrated by Dirsh (1966, 1970), and the epiphallus and female subgenital plate of the same species (unnamed) are shown by Akbar (1966 a). Dirsh (1953, 1956, 1965) gives sketches of the epiphalli alone of *Z. elegans* and *Z. variegatus*.

Subtribe b. PHYMATEINA.

(Figs. 54-64, Pl. IX, figs. G, H).

Tribe *Phymateini* (*partim*), References given above in bibliography of tribal nomenclature from *Phymateinae* Bolívar, 1884, onwards, with the exception of those based on *Pockilocerus*.

Subtribe *Phymateina* Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1507, fig. 1 (map), 1521, 1525.

External features: Size large to very large; pronotum tuberculate or spined, dorsally flat or comparatively so, or even dished; first abdominal tergum never with a prominent median tubercle; tegmina seldom abbreviated, in fully alate forms not parted at base when at rest; hind wings coloured, usually brightly so; often tessellated; hind femora without dark bands or large maculae.

Principal phallic characters: Epiphallus with lateral plates not distinctly widened basally; ectophallus always pyriform, with basal emar-

do 2 ♂♂ and 3 ♀♀ from Benguella [? inland part of district rather than the port] (Dr. Wellman) [Madrid] and 1 ♂ from Chicuma [Hamburg] but, as they are not currently available for study, they are not included among the paratypes. The last is recorded by Kevan (1955) — D. K. K.

gination of cingulum moderately wide, suprazygomal plate often with lateral margins sinuous and convergent, valves of cingulum rather prominent, suprarami or supraramal inflections not well developed, rami in ventral view not broadly rectangular, sheaths not transverse; endophallic apodemes more or less rounded in lateral view, not angular.

Concealed female structures: Subgenital plate without the special features of the previous subtribe; spermatheca always with an apical pocket which is usually very distinct; terminal dilation of spermathecal duct moderately to very elongate.

Distribution: Africa south of Sahara, Madagascar.

Included genera: *Paraphymateus* Dirsh, 1962 (only female known); *Rutidoderes* Westwood, 1837; *Phyteumas* Bolívar, 1904; *Phymateus* Thunberg, 1815 (including subgenus *Maphyteus* Bolívar, 1904¹³).

Species examined: *Paraphymateus roffeyi* Dirsh, 1962 (Somalia — Fig. 56, Pl. IX, fig. 9) [Type species]; *Rutidoderes squarrosus* (Linnaeus, 1771) [= *Phymateus acutus* Walker, 1870 = *Phymateus pardalinus* Walker, 1870] (W. Africa, N. Angola to E. Zaire — Figs. 54, 57) [Type species]; *R. cinctus* (Sjöstedt, 1929) (C. Zaire to W. Kenya); *R. concolor* Kevan, 1962 (SE. Zaire) *Phyteumas purpurascens purpurascens* (Karsch, 1896) Tanzania, E. and C. Kenya, Ethiopia — Figs. 55, 58); *Ph. p. rufovenosus* Bolívar, 1922 [central Africa to SW. Kenya]¹⁴; *Ph. olivaceus* (Karsch, 1896) (SE. Kenya, Tanzania, Ka-

¹³ Apart from the external features distinguishing this subgenus (see Kevan, 1962), the endophallic apodemes possess small ventral processes that seem to be lacking in the typical subgenus.

¹⁴ "*Phymateus purpurascens* Karsch var. *rufovenosis* [sic] n. var." Bolívar, 1922, *Voy. M. Rothschild Ethiop. Afr. or. angl. Anim. Artic.*, I, 171: [also caption to pl. I₀¹, fig. 4 (name correctly spelt)], was differentiated merely by the pale hind wings with purplish veins. An examination of the single ♂ type from [Mau] Escarpment shows that this difference is merely due to the fact that the specimen is discoloured. However, material from the west of the Rift Valley (including the type) in SW. Kenya, S. Uganda, Rwanda and the eastern Zaire differ from typical *Ph. purpurascens* in being generally more robust, with consistently larger anterior bosses and tubercles on the pronotum, and in the tips of the hind wings being almost uniformly green, not very faintly tessellated bluish subapically. Western specimens also have the apices of the hind wings more rounded and their bases a little less extensively red, and the tegmina broader. The phallic structures, although somewhat variable, seem to show no significant difference between eastern and western populations. It may be noted that Bolívar's figure does not illustrate the holotype, but a specimen of typical *purpurascens* from Naivasha collected by Rothschild on the same expedition as that

tanga — Fig. 59) [Type species]; *Ph. whellani* Dirsh, 1953 (E. Rhodesia, S. Malawi). *Phymateus (Maphyteus) leprosus* (Fabricius, 1793) (South Africa — Figs. 60, 61) [Type species of subgenus]; *Ph. (M.) baccatus* Stål, 1876 (southwestern to southeastern Africa); *Ph. (Ph.) morbillosus morbillosus* (Linnaeus, 1758) [= *Dictyophorus papillosus* (Thunberg, 1815) = *Gryllus (Locusta) verrucosus* (Houtuyn in Stoll, 1813)] (Cape Province and adjacent areas of South Africa — Figs. 62, 63) [Type species]; *Ph. (Ph.) morbillosus sjoestedti* Bolívar, 1904¹⁵ [= *Ph. coralliferus* Bolívar, 1904, syn. nov.] (south-eastern Africa to Transvaal and southern Rhodesia); *Ph. (Ph.) karschi* Bolívar, 1904 (Mozambique, E. Tanzania) [synonymized by Dirsh (1970) with *Ph. (Ph.) viridipes* but apparently incorrectly]; *Ph. (Ph.) aegrotus* (Gers-taecker, 1869)¹⁶ [= *hildebrandti* Bolívar, 1884] (eastern and north-eastern Africa); *Ph. (Ph.) pulcherrimus* Bolívar, 1904 (more elevated parts of C. and N. Ethiopia, including Eritrea); *Ph. (Ph.) viridipes* Stål, 1873, s. 1. [= *brunneri* Bolívar, 1884 = *violaceus* Bolívar, 1904 = *bolivari* Kirby, 1910 = *superbus* Anderson, 1914 (*nomen nudum*) = *asiaticus* Chang, 1939¹⁷] (Africa south of the Sahara, except for more

on which the type was taken. No mention is made in Bolívar's text of this or a further male and female with the same data, none of which can therefore be regarded as types. The only text reference is to Mau — D. K. K.

¹⁵ *New status* — This is the more northerly and easterly form of *Ph. morbillosus*, distinguished by its usually rather smaller size (frequently with shorter wings) and more greenish general coloration, the blue or purple of the tegmina and hind wings being reduced and the red of the pronotum more or less confined to the bosses and tubercles. The name was originally spelt "Sjöstedti", but diacritical marks are not now permitted by the International Code of Zoological Nomenclature, which provides for the substitution of the *Umlaut* by an 'e' in German names. No provision, however, is made for Swedish names, but presumably one may read "Germanic" for "German". In fact one would assume that whenever a dieresis is a "shorthand" substitute for an 'e', the same practice should be followed — D. K. K.

¹⁶ There is considerable confusion in the early literature, the name *aegrotus* having been used for *Ph. (Ph.) viridipes* Stål — D. K. K.

¹⁷ *violaceus*, *bolivari* and *asiaticus* are new synonymies. The type of *violaceus* has not been rediscovered in Paris (where it is supposed to be), nor is it in Madrid (where its describer's collections are housed), and it must be regarded as lost. However, there seems little room for doubt that the species merely represents a purple colour form of *viridipes* which is known from north Tanzania along with the more typical form. The name *bolivari* was merely proposed for Bolívar's mistaken concept of *stolli* (= *cinctus*). The type of *asiaticus* is also lost, but the figure is quite adequate to show that it differed not at all from

north-westerly and westerly regions — Fig. 64); *Ph. cinctus* (Fabricius, 1793) [= *stolli* Saussure, 1861 = *flavus* Bolívar, 1904] (Senegal to S. Uganda and SW. Kenya); *Ph. (Ph.) madagassus* Karsch, 1888 [= *grandidieri* Bolívar, 1904] (Madagascar); *Ph. (Ph.) saxosus* Coquerel, 1861 [= *buyssoni* Bolívar, 1903 = *punicus* Bolívar, 1904 = *cardinalis* Bolívar, 1904] (Madagascar).

Other species: None known.

The nomenclature of several members of this subtribe has become much confused in the literature, but, in spite of their large size, showy appearance, frequent occurrence in museum collections, and that several species are of some economic importance, no revision has been published, except for the Madagascar species (Dirsh, 1963). The only reasonably comprehensive account of them is that of Bolívar (1904), which is quite unsatisfactory, even taking into account such synonymies as have been more recently established. Dirsh (1966, 1970) deals with several species, but his treatment of *Phymateus* is not very critical and contains errors; his (1970) key and diagnoses for *Rutidoderes* are to some extent misleading.

Of all genera of *Pyrgomorphidae*, the concealed copulatory structures of *Phymateus* have received most thorough attention. Slifer (1940) figured the spermatheca of *Ph. (Ph.) m. morbillosus*, and both Roberts (1941) and Dirsh (1956) discussed and illustrated the phallic structures of the same form as their principal representative of the *Pyrgomorphidae*. Dirsh (1961) also figures the phallic structures, other than the epiphallus. The earliest discussion of a member of the genus, however, was that of Chopard (1920), who gives some rather unsatisfactory sketches of the phallic structures of *Ph. (Ph.) saxosus*; Roberts (1941) refers to this species but does not figure it. Dirsh (1956) illustrates some details of the phallic structures as well as the sperma-

some individuals of *viridipes*, a widespread and rather variable species. It is allegedly from China, and its author enters into a lengthy discussion of the evidence for *Phymateus* as an Asiatic genus, but all his references are old and unreliable. The type was from alcohol-preserved material from United States National Museum, Washington, and personal experience indicates that this not infrequently became mislabelled, as is certainly true in the present instance. *Ph. (Ph.) viridipes brunneri* seems to be subspecifically distinct (*stat. nov.*), having the blue of the hind wing a little more extensive than the red, instead of the reverse as in typical *viridipes*; it is found Angola (except the southernmost parts), through Zaire to southern Uganda; in central Africa intermediates are common — D. K. K.

theca of this species and *Ph. (Ph.) madagassus*; Dirsh and Descamps (1968) repeat these figures. The epiphallus of *Ph. (Maphyteus) leprosus* is shown by Dirsh (1956, 1965). That of *Ph. (Ph.) v. viridipes* is figured by the same author (Dirsh, 1965). Agarwala (1954) mentions some features of the female subgenital plate in the same species, but does not illustrate them. Outside the genus *Phymateus*, only the epiphallus of *Phyteumas purpurascens* has been figured (Dirsh, 1953 [as *Phymateus*], 1956, 1961).

NOTE.

Kevan, Akbar and Chang (1970), in their treatment of the tribe *Psednurini* use and illustrate the species *nana* as their example of the genus *Proppednura*. We understand from Dr. K. H. L. Key (personal communication, 1968), that this species differs appreciably in phallic and other characters, from the type species of the genus, *P. eyrei* Rehn, 1953, and that, indeed, the two may not be congeneric. Dr. Key has further indicated that *P. eyrei* may be confined to Western Australia and that South Australian specimens may belong to an undescribed species. It may also be noted that the minute apical spermathecal bulb shown by the above authors for *Psednura musgravei* appears to be lacking in other specimens. I understand Dr. Key will shortly publish a revision of the *Psednurini* — D. K. K.

List of Abbreviations.

The following is a list, arranged alphabetically, of the abbreviations used in the illustrations; those for both sexes are combined in one list.

- A, Appendix of epiphallus.
- AB, Apical bulb of spermathecal appendage.
- AC, Apodemal plate of cingulum.
- AE, Aedeagus.
- AP, Anterior projection of epiphallus.
- APO, Apical pocket of spermatheca.
- AS, Aedeagal sclerite.
- AV, Aedeagal valve.
- B, Bridge of epiphallus.
- BC, Basal thickening of cingulum.

- BE, Basal emargination of cingulum.
BF, Basal fold of ectophallic membrane.
C, Columella of female subgenital armature.
CA, Contact area of female subgenital armature.
CM, Central membrane of ectophallus.
CV, Valve of cingulum.
DC, Dorsal cleft of cingulum.
DI, Dorsal inflection of endophallic apodeme.
DSP, a dorsal diverticulum of the spermatophore sac (*Chlorizeinina*).
DTR, Dorsal transverse ridge of cingulum.
E, Epiphallus.
EA, Endophallic apodeme.
ED, Ejaculatory duct.
EG, Egg-guide.
EI, Epiphallic infold.
EM, Ectophallic membrane.
ES, Ejaculatory sac.
G, Gonopore (male).
IR, an internal inflected process on the ramus of the cingulum.
ISR, Inflection of ramus or supraramus.
L, Lophus of epiphallus.
LL, Lateral lobe of ectophallic membrane.
LOC, Lateral oblique thickening of cingulum.
LP, Lateral plate of epiphallus.
MLG, Median longitudinal groove of ovitract (egg-guide).
O, Orifice of spermathecal duct.
P, Phallotreme.
PD, Phallotreme duct.
PE, Posterior edge of female subgenital plate.
PVS, Post-vaginal sclerite of female genital chamber.
PZ, Pseudoarch of ectophallus.
R, a longitudinal, mid-dorsal ridge of the cingulum.
RC, Ramus of cingulum.
S, Sheath of ectophallus.
SA, Spermathecal appendage.
SC, Caecum of spermatheca.
SD, Spermathecal duct.
SL, Secondary diverticulum of spermathecal appendage.
SP, Spermathecal vesicle.

- SR, Supraramus of cingulum.
 SS, Spermatophore sac.
 SV, Valve of spermathecal duct.
 SZ, Suprazygomal plate of cingulum.
 TD, Terminal dilation of spermathecal duct.
 V, Vulva, or Opening of vagina, or Common oviduct, or Female gonopore.
 VAC, Ventral process of apodemal plate of cingulum.
 VAV, a ventral process on the aedeagal valve.
 VC, Ventral cleft of cingulum.
 VED, Valve of ejaculatory duct.
 VI, Ventral infold of ectophallic membrane.
 VLC, Ventral longitudinal thickening of cingulum.
 VLR, Ventral lobe of ramus of cingulum (*Pterorthacris*).
 VOC, Ventral oblique thickening of cingulum (displaced VLC).
 VP, Ventral process of cingulum.
 VTC, Ventral transverse thickening of cingulum.
 Z, Zygoma of cingulum.

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EXPLANATION OF PLATES II-IX

PLATE II:

Monistriini, types. [For details, see Key (1969) and pp. 357-410, footnotes 5 and 6]:

Figs. A, B.—*Scutilla verrucosa* Sjöstedt, ♀ paralectotype (London).

Figs. C, D.—*Petasida ephippigera* White, ♀ holotype (London).

Figs. E, F.—*Cygniterra maculicornis* (Sjöstedt), ♀ lectotype (London).

[In addition to the lectotype of *C. maculicornis*, there is a ♂ paralectotype ("Co-typus") in the British Museum and another in Stockholm bearing similar labels to the lectotype; a third ♀ paralectotype is in Hamburg, labelled "Hamburg S.-W. Austr. Exped. 1905, Stat. 131. Serpentine, 23-25-IX"].

PLATE III:

Monistriini, types. [For details, see Key (1969)]:

Figs. A, B.—*Monistria* (*Monistria*) *latevittata* Sjöstedt, ♀ holotype (Hamburg).

Figs. C, D.—*M. (M.) discrepans discrepans* (Walker), ♀ holotype (London).

Figs. E, F.—The same, ♀ holotype of *M. ligata* Bolívar (Hamburg not Madrid as stated by Rehn (1953) — see Key (1969). [Photo: H. Schäfer. Sjöstedt (1921) also illustrates this Hamburg specimen as the holotype and designates as a so-called allotype, a Stockholm Museum ♂ from Sydney. This latter has no type status as only the female was originally described. There is room for doubt concerning the holotype, as, in the original description, the species name is attributed by its author to von Brunn of Hamburg, whereas in the Vienna Museum, in Brunner von Wattenwyl's collection, are three females, all labelled "Neuholland" and "*Monistria ligata* m.", and standing under a cabinet label "*M. ligata mihi*" (i. e., Brunner von Wattenwyl, not von Brunn). The specimen illustrated in Pl. IX, figs. J, K, has the same measurements as in the original description (but does not bear the type locality, "Sydney") and the number 3931. It is conceivable that the original description may have been based on this Brunner (not Brunn) specimen. However, in view of the doubt, one must, with Key (1969), accept the Hamburg

specimen as holotype. The other two Vienna specimens are numbered 11852 and have been determined by Sjöstedt as *M. conspersa* = *M. (M.) discrepans conspersa*].

Figs. G, H.—*M. (M.) discrepans bolivari* Brancsik, ♀ holotype of *M. ecarinata* Sjöstedt, 1921 (Madrid). [The holotype of *M. bolivari* was destroyed in the fire at the Budapest Museum in 1956; a neotype has been designated by Key (1969)].

Figs. I, J.—*M. (M.) discrepans conspersa* Stål, ♀ holotype (Stockholm).

PLATE IV:

Monistriini, types. [For details, see Key (1969)]:

Figs. A, B.—*Monistria (Monistria) concinna concinna* (Walker), ♀ holotype (London). [In Paris is a ♀ labelled "Australie, v. Mueller, 253-95", and "*Monistria Brancsiki* Bol. Bolívar det. 1909". This was presumably to have been the type of a species never described].

Figs. C, D.—*M. (M.) concinna vinosa* Carl, ♂ holotype (Geneva).

Figs. E, F.—The same, ♀ holotype of *M. olivacea* Sjöstedt, 1921 (London).

Figs. G, H.—The same, ♀ holotype of *M. grossa* Sjöstedt, 1921 (London).

Figs. I, J.—The same, ♀ paralectotype of *M. brevicornis* Sjöstedt, 1932 (Stockholm) [labelled "Kosciusko, Feb. 1928, M. Fuller", Sjöstedt's determination and "Co-typus" labels; the lectotype, selected by Rehn (1963) is in Canberra and bears the same data].

PLATE V:

Monistriini, types. [For details, see Key (1969)]:

Figs. A, B.—*Monistria (Monistria) concinna lacrimans* Sjöstedt, ♀ lectotype (Vienna).

Figs. C, D.—The same, ♀ paralectotype (Stockholm) [with "Australian Coll. Br. v. W. ex Coll. Edw. Brown" (like lectotype), Sjöstedt's determination, white "Type" and red "Co-typus" labels].

Figs. E, F.—*M. (M.) c. flavogranulata* Sjöstedt, ♀ lectotype (London). [In Stockholm is a ♀ paralectotype with similar data to the lectotype except that is labelled "Co-typus" (on red)].

Figs. G, H.—*M. (M.) pustulifera pustulifera* (Walker), ♀ holotype (London).

Figs. I, J.—*M. (M.) pustulifera pustulosa* Stal, ♀ holotype (Stockholm).

PLATE VI:

Monistriini, types. [For details, see Key (1969)]:

Figs. A, B.—*Monistria (Monistria) pustulifera maculata* (Tepper), juvenile holotype of *M. flavopustulata* Sjöstedt, 1921 (London).

Figs. C, D.—The same, ♀ lectotype of *M. speciosa* Sjöstedt, 1921 (London). [In London is also a ♀ paralectotype with similar data to the lectotype, but with the acquisition number 1909-55 instead of 1911-311, and with a "Co-type" label].

Figs. E, F.—The same, ♀ lectotype of *M. petasialis* Sjöstedt, 1921 (London).

Figs. G, H.—The same, ♂ paralectotype (London) [similarly labelled to the lectotype; there are also in London three more similar paralectotypes (2 ♂ ♂, 1 ♀)].

Figs. I, J.—*Monistria (Monistria) picta* Sjöstedt, ♂ paralectotype (Stockholm). [See Rehn (1953) and Key (1969); the ♀ lectotype is in Madrid and bears the same data as the lectotype, namely, "Tennants Ck., S. A." (now Northern Territory), not merely "Australia", as given in the original description. A further ♀ in Madrid, with the same data, does not bear the determination label and has no type status].

PLATE VII:

Monistriini and *Chlorizeinini (Humpatellina)*, types. [For details of *Monistriini*, see Key (1969)]:

Figs. A, B.—*Monistria (Monistria) profundesulcata* Carl, ♀ holotype (Geneva).

Figs. C, D.—The same, ♀ holotype of *M. roseipennis* Sjöstedt, 1920 (Stockholm).

Figs. E, F.—The same, ♀ holotype of *M. cordata* Sjöstedt, 1921 (Hamburg).

Figs. G, H.—*Humpatella constricta* Karsch, ♂ holotype (Berlin). [This specimen bears the data "Huilla-Humpata", Karsch's determination and a "typus" label].

Figs. I, J.—*Humpatella severini* Bolívar, ♀ holotype (Brussels). [This specimen is labelled: (1) Lukungu, Ch. Haas; (2) *Humpatella severini* X (in Bolívar's hand); (3) *Humpatella severini* Bol. Type. det. Bolívar, 1904 (altered from 1908); (4) Type; (5) Dr. W. Ramme vid. 1933 *Humpatella severini* Bol.].

Figs. K, L.—*Humpatella huambae* Uvarov, ♂ holotype (London). [This specimen is labelled: (1) E. Angola, Distr. of Moxico, Huamba, 1.v.1927, M. Burr; (2) Brit. Mus. 1927-377; (3) *Humpatella huambae* n. sp. Type. det. B. Uvarov, 1936; (4) Type (red-bordered British Museum disc.). There are also three ♀ paratypes with similar labels, except that the determination label reads "Paratype" and the type label is yellow-bordered and reads "Co-type"].

PLATE VIII:

Chlorizeinini (*Humpatellina* and *Marsabitacridina*), types:

Figs. A, B.—*Pseudorubellia brancsiki* (Bolívar), ♂ holotype (Madrid). [This specimen now lacks the end of the abdomen. It is labelled as follows: (1) Madag.; (2) Orthoptère appartenant à Mr. Flentiang (?), Madagascar. It does not now bear Bolívar's determination label. In the original description, other specimens (not true types) from Diego Suárez are mentioned, but none has been traced. There is, in Madrid, another ♂ in good condition, labelled "Madagascar, Mont d'Ambre" and "R. du Buysson", but it is not a type].

Figs. C, D.—*Pseudorubellia thoracica thoracica* Dirsh, ♀ holotype (Paris). [This specimen bears the following labels: (1) Ampijoroa, Tsaramandroso (printed); (2) Institut Scientifique Madagascar (printed on blue); (3) *Pseudorubellia thoracica* sp. n. Type V. M. Dirsh det. 1962; (4) a red-bordered British Museum "Type" disc. It measures 26.5 mm.; tegmina 8.8 mm.; hind femur 14.0 mm. In the original description there is an error, as a different specimen (Ampijoroa, 170 m., Ankarafantsika) is indicated as being the holotype. This is in the British Museum and is labelled as a paratype. It measures 29.5 mm.].

Figs. E, F.—*Pseudorubellia thoracica geniculata* Dirsh and Descamps, ♂ holotype (Paris) [The data are given by Dirsh and Descamps (1968)].

Figs. G, H.—The same, ♀ allotype (Paris) [Same data as holotype].

Figs. I, J.—*Marsabitacris citronota* Kevan, ♂ holotype (London). [This specimen bears the following labels: (1) Scrubby bushes, 02° 25' N., 38° 03' S., Chopa Gof, Marsabit, Kenya, 13.vi.1946, D. K. Kevan coll.; (2) *Marsabitacris citronotus* [sic], Det. D. K. McE. Kevan, 1957, Type n. g. n. sp.; (3) red-bordered British Museum "Holotype" disc.

Figs. K, L.—*Katangacris enigmatica* Kevan, ♂ holotype (Lyman Entomological Museum, McGill University). [This is labelled: (1) Katanga, Jadotville, x.1956; (2) *Katangacris enigmatica* n. g. n. sp. Det. D. K. McE. Kevan, 1964, Type; (3) "Type" disc.

PLATE IX:

Phymateini and *Monistriini*, types:

Figs. A, B.—*Physemophorus sokotranus* (Burr), ♀ lectotype (Oxford). [This specimen, which measures 31.4 mm., carries the following labels: (1) and (2) Socotra, Capt. Dec. 17.96 to Feb. 11.1897 and pres. '97 by E. N. Bennett, P. Z. S. '98 p. 372, No. 87, Plate XXX, fig. 4; (3) 1897, 6123; (4) Type *Poecilocerus sokotranus*, 1898, M. B.; (5) and (6) Type, Burr, P. Z. S. 1898, page 384, pl. 30, fig. 4; (7) *Poecilocera socotrana* Burr Type (typewritten); (8) Lectotype ♀ *Poecilocerus* (now *Physemophorus*) *sokotranus* Burr '98, Det. D. K. McE. Kevan, 1958; (9) Type. Orth: 61/3 *Poecilocerus sokotranus* Burr, Hope Dept., Oxford].

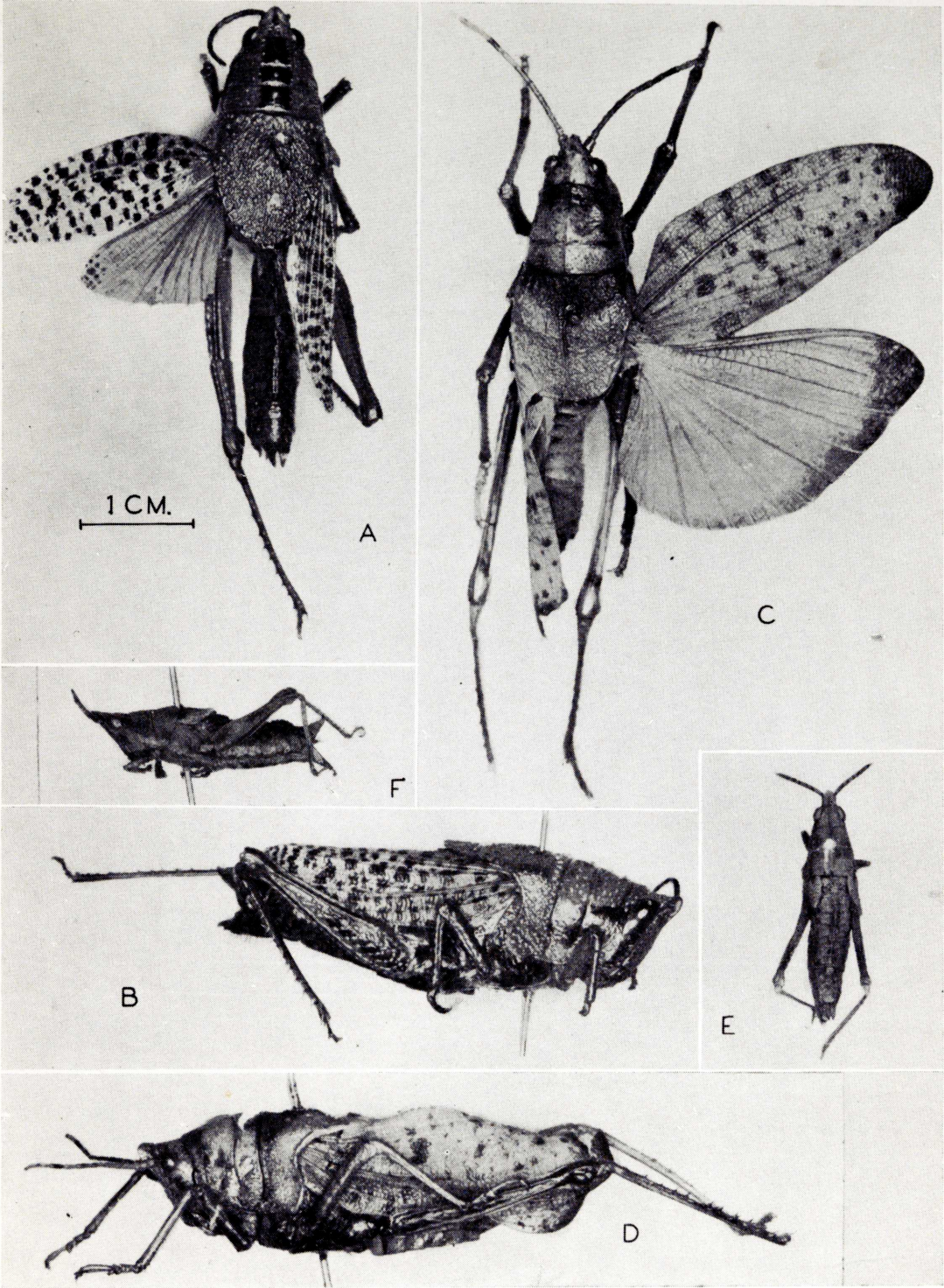
Figs. C, D.—*Zonocerus elegans angolensis* Kevan, n. ssp., ♂ holotype (Philadelphia). [For details, see footnote 12].

Figs. E, F.—The same, ♀ allotype (Philadelphia). [For details, see footnote 12].

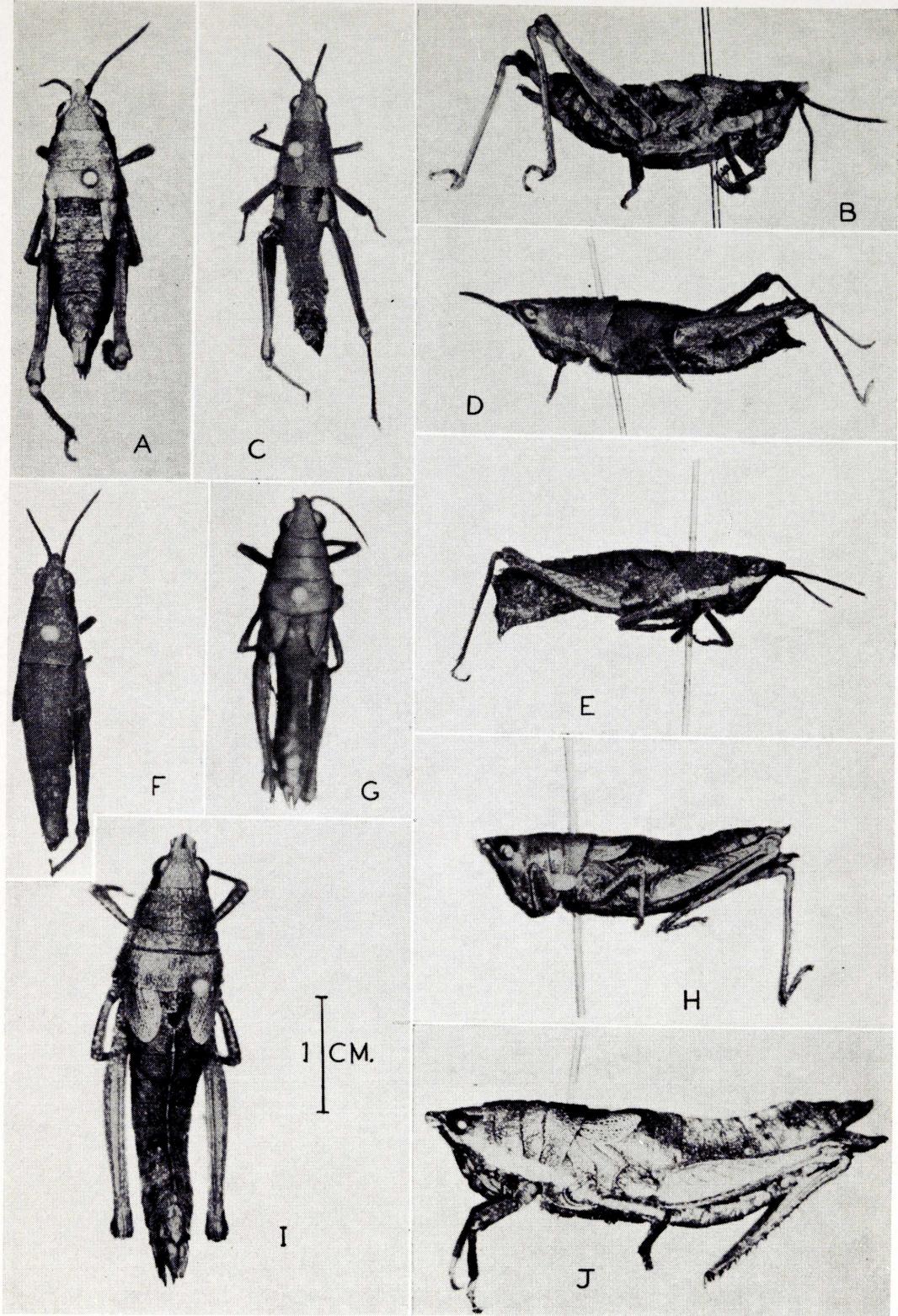
Fig. G.—*Paraphymateus roffeyi* Dirsh, ♀ holotype (London). [This is labelled as follows: (1) Somali Republic, S. Region, 7 m. N. Bulu Burti, 27.ii.1960, J. Roffey; (2) Brit. Mus. 1962-75; (3) *Paraphymateus roffeyi* g. sp. n., V. M. Dirsh det. 1961, Type; (4) red-bordered British Museum "Type" disc.].

Figs. H, I.—*Monistria pustulifera pustulosa* Stål, ♂ holotype of *M. mastax* Sjöstedt, 1921 (Hamburg) [Photo: H. Schäfer. For details, see Key (1969)].

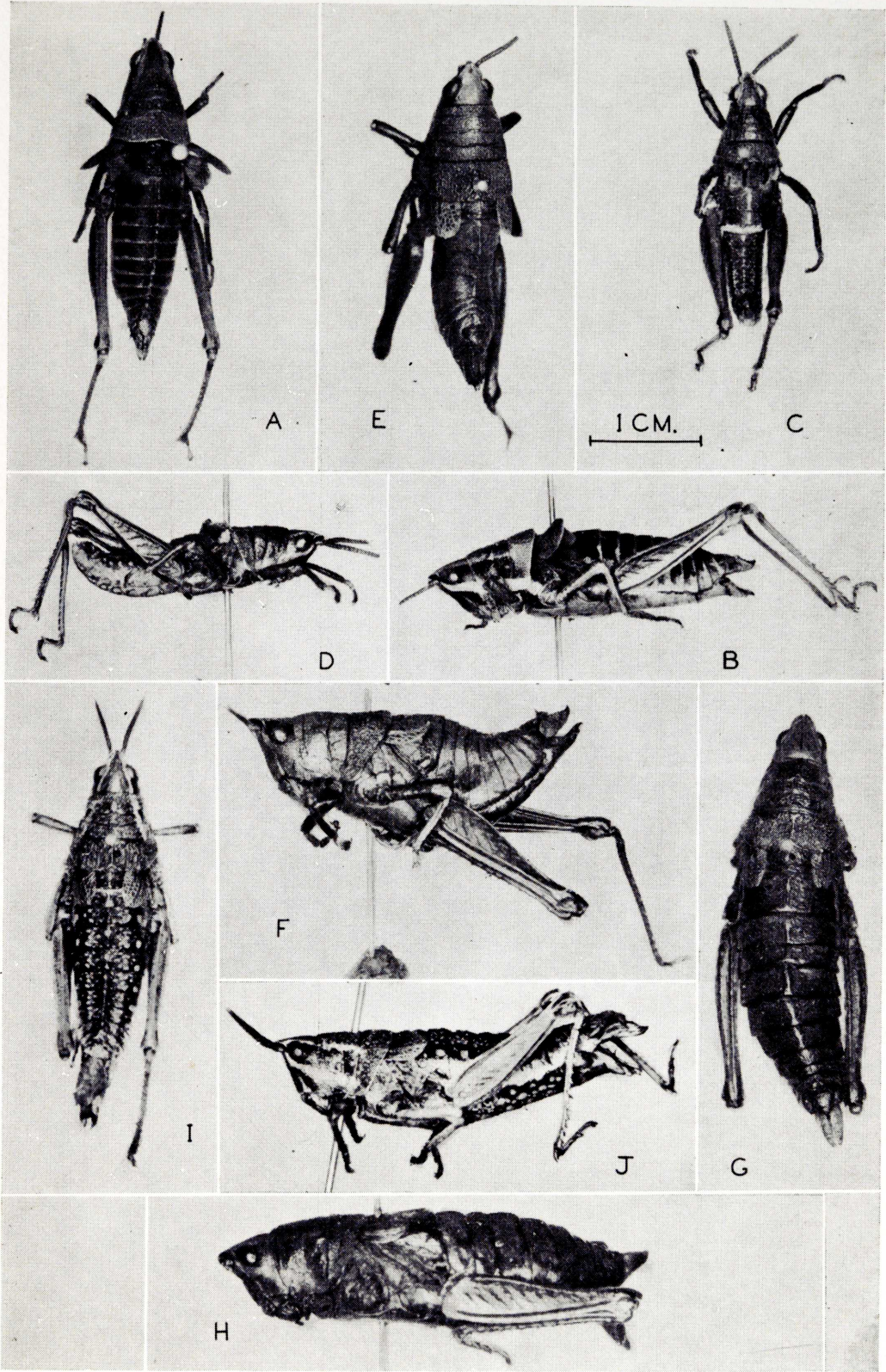
Figs. J, K.—*Monistria discrepans discrepans* (Walker), ♀ of Vienna series of *M. ligata* Bolívar referred to in caption to Pl. II, figs. E, F.



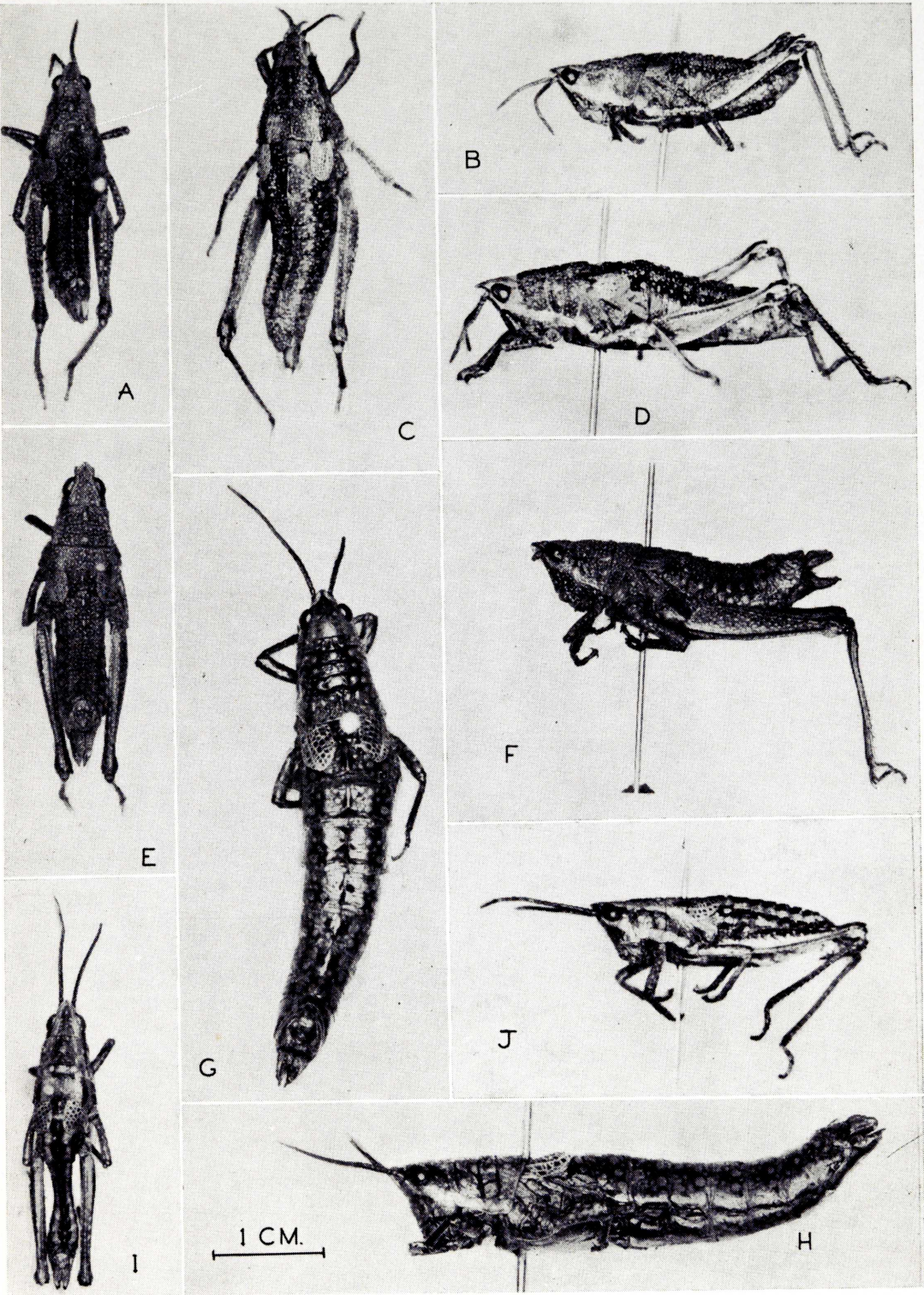
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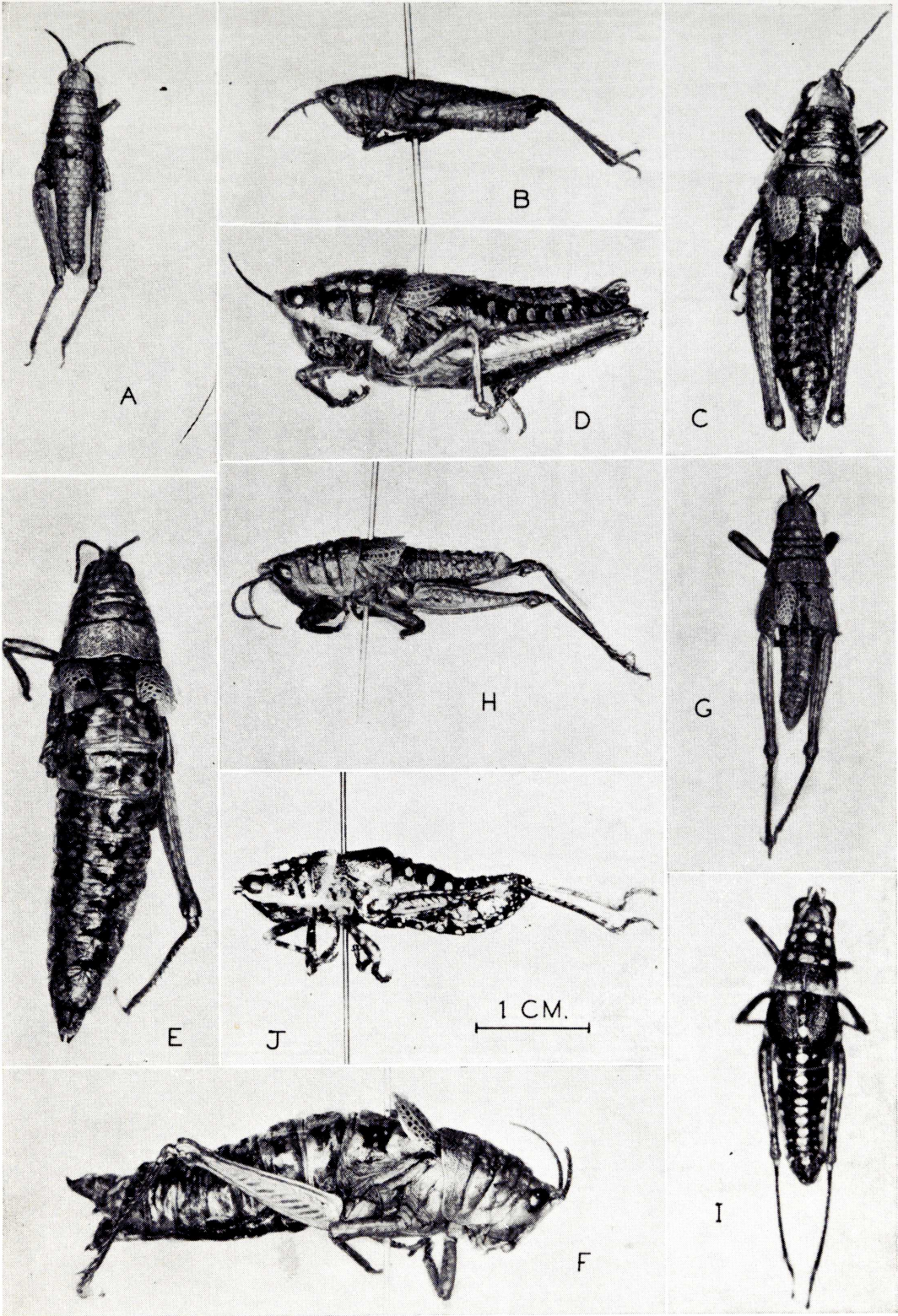
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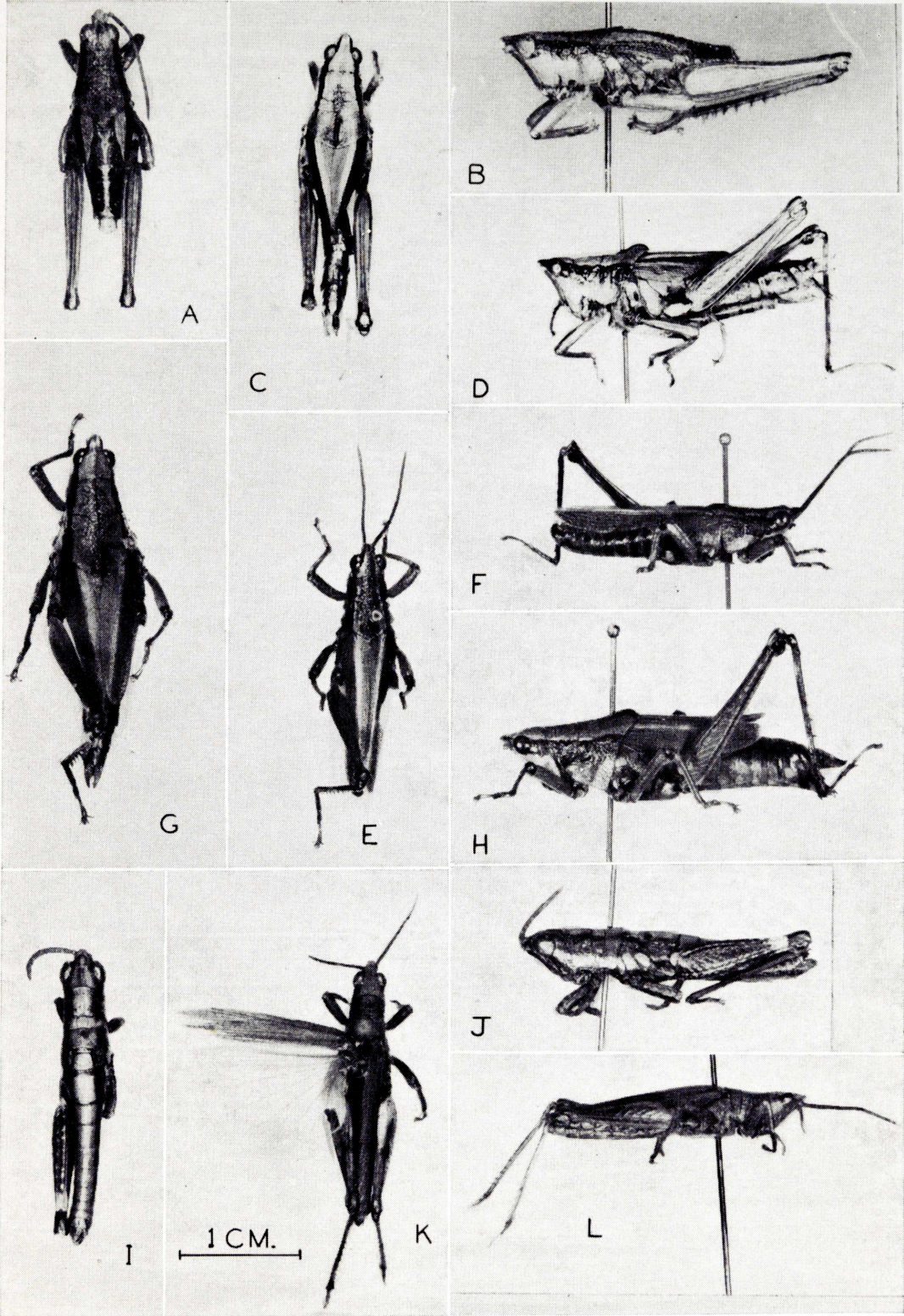
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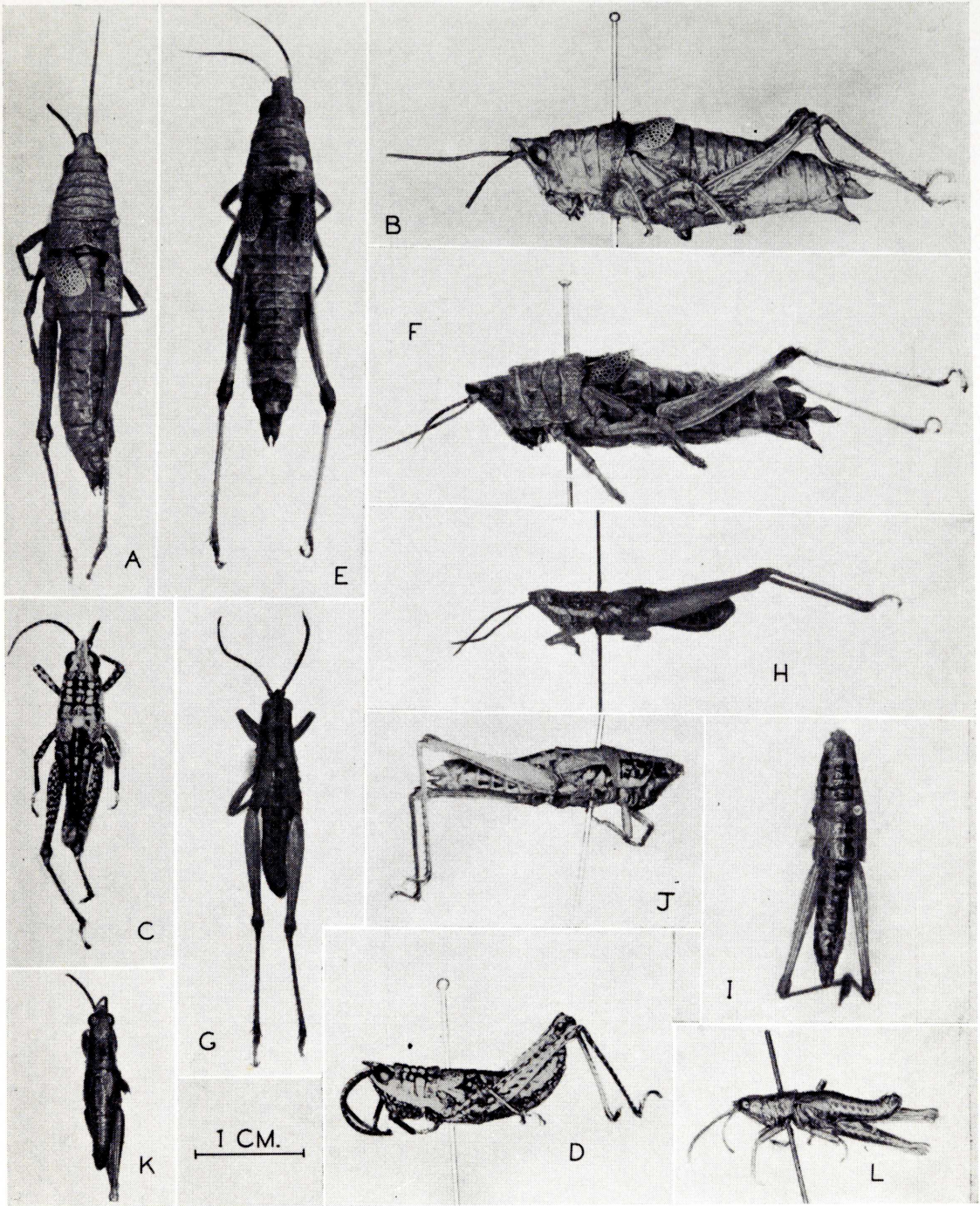
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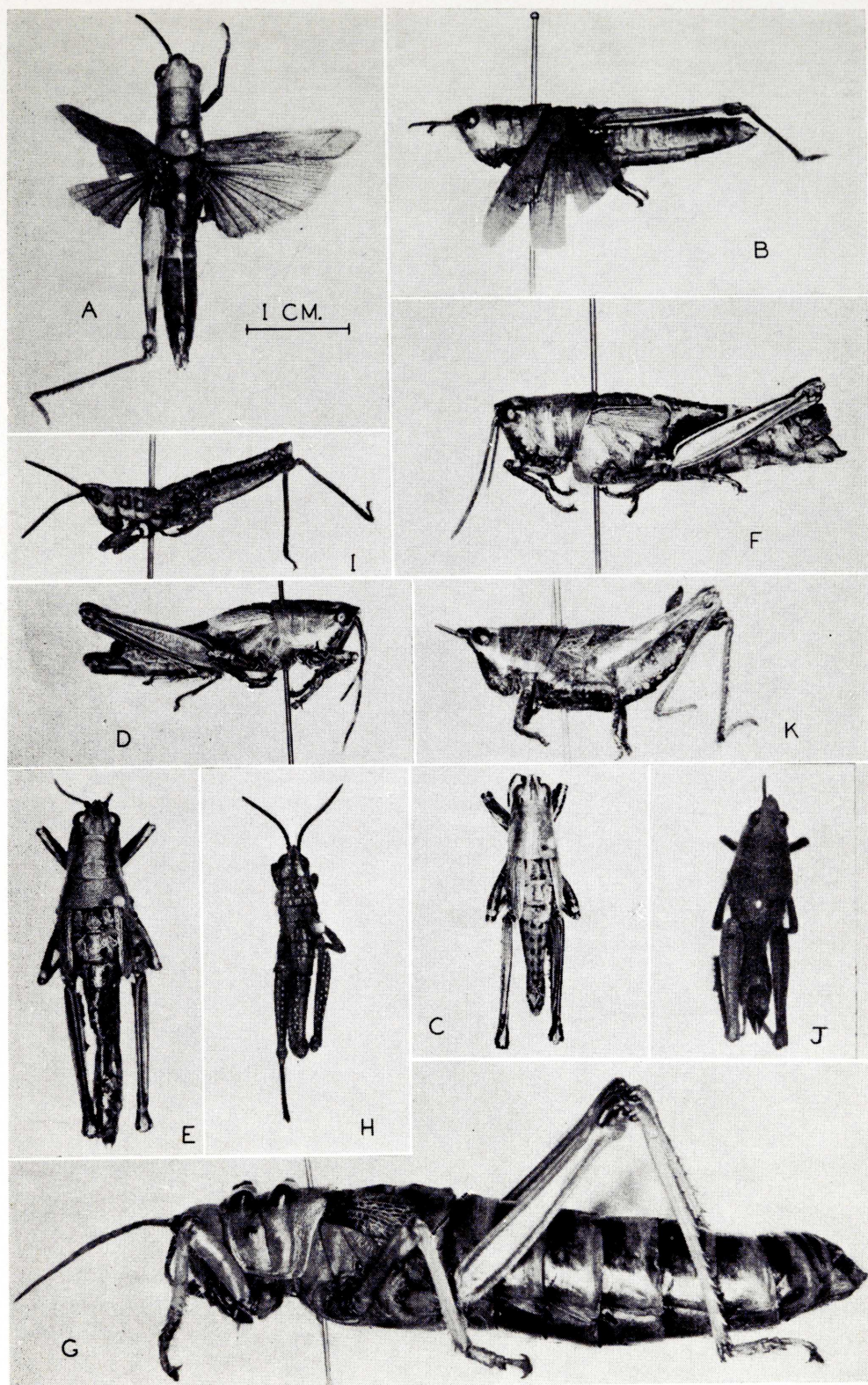
D. KEITH MCE. KEVAN, SYED S. AKBAR and YU-CHEN CHANG: The concealed copulatory structures of *Pyrgomorphidae*.



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